TENDER FOR EXTERNAL ELECTRICAL WORKS
PART – A (SUPPLY OF HT PANEL).

NAME OF THE WORK : **"LOGIX BLOSSOM ZEST"**
AT SECTOR - 143 NOIDA (U.P.)

Architect:

Services consultant

[Consummate Engineering Services Pvt. Ltd.]

B-67, SECTOR – 67, Noida – 201301 Tel. : (0120) 2303500 (24 Lines)

Lko. Office : R 006, Rohtas Plumeria, Gomti Nagar, Lucknow,

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TECHNICAL SPECIFICATIONS OF HT PANELS

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33 KV SWITCH GEAR

1. Design Criteria

a) 33 KV HT Panel shall be used to receive the power from SEB and to feed supply to the installation through the step down transformer to further loads as per SLD.

b) Switchgear shall be located in a clean but hot, humid and tropical atmosphere.

c) For continuous operation at specified ratings. Temperature rise of the various switchgears components shall be limited to the permissible values stipulated in the relevant standards.

d) The switch gears and components thereof shall be capable of withstanding the mechanical forces and thermal stresses of the short circuit current listed in the BOQ without any damage or deterioration material.

e) Circuit breakers, instrument transformers, bus bars, cable compartment etc. shall be housed in separate compartment within the cubicle. The design shall be such that failure of one equipment shall not affect the adjacent units.

f) Circuit breakers of identical rating shall be physically and electrically interchangeable.

g) Panels shall be fully compatible with substation automation/SCADA

h) All the plant/ apparatus/equipment supplied shall comply in all respect with the requirement of Indian Electricity Rule 1956/ISS and latest amendment thereof during execution of contract wherever applicable

2. Standards

All equipment, material and components shall comply with the requirements of the latest editions of Indian Standards with updated amendments. Standards and Regulations applicable in the area where equipment is to be installed shall also be followed.

The equipment offered complying with other standards, these standards shall be equal to or superior to those specified and full details of the differences shall be furnished along with the tender.

Some of the relevant Indian and British Standards are listed below:

IEC-60056 / IS 13118	:	Circuit Breakers
IS 3427	:	Metal enclosed Switchgear & Control Gear
BS 162	:	Safety Clearances
IS 2705	:	Current Transformers (Parts 1 to 4)
IS 3156	:	Voltage Transformers (Parts 1 to 4)
IS 1248	:	Ammeter and Voltmeter
IS 3202	:	Code of Practice for climate proofing of electrical equipment
IS 375	:	Marking & Arrangement for Switchgear Bus Bars, main connections and auxiliary wiring.
IS 722	:	A.C. Electric Meters (digital).
IS 13779	:	Digital microprocessor based / static) electrical measuring instruments & testing accessories.
IS 3231	:	Electrical Relays for Power System Protection (digital).
IS 2544	:	Epoxy Cast Resin Insulators
IS 5082	:	Electrolytic Copper and Aluminium
IS 5792	:	High Voltage HRC fuses
IS 12729/ IEC 298, 694	:	M.V. switchgear

3. Specific Requirements

a) Construction Features

(i) The Switchgear shall be indoor, metal-clad, floor mounted, drawout type.

(ii) The Switchgear shall be such as to allow extension at either end.

(iii) The Switchgear enclosure shall conform to the degree of protection IP4X as per IS : 3427.

(iv) The minimum thickness of sheet steel used shall be 2 mm CRCA.

(v) The switchgear shall be dead-front, free standing type vertical cubicle.

(vi) Switchgear shall have a front hinged door with latches and a removable back cover.

(vii) All covers and doors shall be provided with neoprene gaskets.

(viii) All relays, meters, switches and lamps shall be flush mounted on the respective cubicle door or on control cabinet built on the front of the cubicle.

(ix) The complete structure shall be free, rigid, self supporting, free from twist and bends etc.

(x) Floor mounted cubicles shall be provided with a 50mm high channel base frame. The total height of the cubicle shall not exceed 2500mm

b) Bus and Bus Taps

(i) The main buses and connections shall be of high conductivity electrolytic copper, sized for specified current ratings with maximum temperature limited

to 85 degree C (i.e. 35 degree C rise over 50 degree C ambient) The bus-bars should be rated for 26.3 KA for 3 sec.

(ii) Bus bars and connection shall be fully insulated for working voltage with adequate phase / ground clearances. Insulating sleeves for bus bars and cast-resin shrouds for joints shall be provided.

(iii) All buses and connections shall be supported and braced to withstand stresses due to maximum short circuit current and also to take care of any thermal expansion.

(iv) Bus bars shall be colour coded for easy identification and so located that the sequence R-Y-B shall be from left to right, top to bottom or front to rear, when viewed from front of the switchgear assembly.

(v) The bus bars shall be air insulated and housed in a separate compartment, segregated from all other compartments

(V) Direct access to accidental contact with bus bars and primary connections shall be avoided by providing shrouds. All apertures and slots shall be protected by barriers to prevent accidental shorting of bus bars. To provide a tight seal between cubicles, bushings or insulating panels shall be provided for bus bars crossing from one cubicle into another.

c) Circuit Breakers

(i) Circuit breakers shall be triple pole, single throw and shall be Vacuum type for 33 KV Panel.

(ii) Circuit breakers shall be draw out type, having SERVICE, TEST and DISCONNECTED position with positive indication for each position.

(iii) The operating time (break time) of the breaker shall be maximum of 3 cycles.

(iv) Circuit breaker shall have motor wound spring charged trip free mechanism with anti-pumping feature and shunt trip. In addition, facility for manual charging of spring shall be provided.

(v) For motor wound mechanism, spring charging shall take place automatically after each breaker closing operation. One open-close open operation of the circuit breaker shall be possible after failure of power supply to the motor.

(vi) Mechanical safety interlock shall be provided to prevent:

- The circuit breaker from being racked in or out of the service position when the breaker is closed.
- Racking in the circuit breaker unless the control plug is fully engaged.

(vii) Automatic safety shutters shall be provided to fully cover the female primary disconnects when the breaker is withdrawn.

(viii) Each breaker shall be provided with an emergency manual trip, mechanical ON-OFF indication, an operation counter and mechanism charge / discharge indicator.

(ix) Each breaker shall be provided with following:

- Auxiliary switch, with 6 NO + 6 NC contacts, mounted on the draw out

portion of the switchgear.

- Position / cell switch with 3NO + 1 NC contacts, on each for TEST and SERVICE position.

(x) Control & Indication:

Breaker cubicle shall be equipped with following:

- One (1) No. spring return type TNC switch for closing and tripping of the breaker.
- One (1) No. Push button operated mechanical mechanism for tripping.
- Three (5) Nos. indicating lamps on front of compartment

GREEN	Breaker Open and Spring Charged
RED	Breaker Closed
AMBER	Breaker Trip
BLUE	Trip circuit supervision

- Lamps shall be of LED type. Lamps and lens shall be replaceable from the front.
- Each circuit breaker shall be provided with a anti-pumping relay, Trip coil supervision relay and fast trip relay in addition to those shown in the drawing.
- Metering device and protective relays for switchgear shall be provided as shown in the attached drawings.
- Breaker shall be horizontal isolated and horizontal draw out type.

d) Current Transformers

(i) Current transformer shall be cast resin type. All secondary connections shall be brought out to terminal blocks where connections will be made.

(ii) The design and construction shall be sufficiently robust to withstand thermal and dynamic stresses due to the maximum short circuit current of the circuit

(iii) Separate current transformers (core) shall be used for metering and protection

(iv) Accuracy class of Current Transformers shall be :

- Class 5P20 for relaying
- Class PS for differential protection
- Class 1.0/0.5 as specified and ISF<5 for metering.

e) Voltage Transformers

(i) Voltage Transformers shall be of cast-resin type having accuracy class of 1.0 / 0.5 and shall be mounted on draw out trolley.

(ii) High voltage winding of voltage transformer shall be protected by current

limiting fuse. The voltage transformer and fuse shall be completely disconnected and visibly grounded in fully draw-out position.

(iii) Low voltage fuses, sized to prevent overload, shall be installed in all ungrounded secondary leads. Fuse shall be suitably located to permit easy replacement while the switchgear is energized.

f) Relays

(i) Relay shall be of Numerical type, communicable with PLC through RS 485 port on Modbus and with built – in testing facilities. Small auxiliary relays may be in non-drawout execution and mounted with in the cubicle.

(ii) Relays shall be rated for operation on secondary voltage and secondary currents **as shown on drawings**. Number and rating of relay contacts shall suit the job requirements.

(iii) Relays shall be enclosed in rectangular shaped cases, suitable for flush mounting only, dust tight covers projecting from the front cover panel. The case shall be dust tight, damp proof and tropicalised.

(iv) Relays shall be accessible for setting from the front. Access to setting devices shall be possible only after removal of front cover.

g) Meters

i. Ammeter and Voltmeter shall be digital type, switch board type .

ii. Energy Analyser shall be digital type, switch board type and accuracy class of + (1% full scale + 1 count).

h) Secondary Wiring

(i) The switchgear shall be fully wired at the factory to ensure proper functioning of control, protection, transfer and interlocking schemes.

(ii) Fuse and links shall be provided to permit individual circuit isolation from bus wires without disturbing other circuits. All spare contacts of relays, switches and other devices shall be wired upto terminal blocks.

(iii) Wiring shall be done with flexible, 650V grade, PVC insulated, FRLS, switchboard wires with stranded copper conductors of minimum 2.5 sq. mm for control, current circuits and for voltage circuits.

(iv) Each wire shall be identified, at both ends, with permanent markers bearing wire numbers as per contractor's Wiring Diagram.

(v) Wire terminations shall be made with crimping type connectors with insulating sleeves. Wires shall not be spliced between terminals.

i) Terminal Blocks

(i) Terminal blocks shall be 660 V grade box-clamp type with marking strips similar to ELMEX 10 Sq. mm or equal. Terminals for CT secondary leads shall

have provision for shorting.

(ii) Not more than two wires shall be connected to any terminal. Spare terminals equal in number to 20% active terminals shall be furnished.

j) Cable Termination

(i) Switchgear shall be designed for cable entry from the bottom. Sufficient space shall be provided for ease of termination and connection.

(ii) Power cables shall be XLPE insulated, armoured, overall PVC sheathed with stranded Aluminium conductor.

(iii) Control cables shall be PVC insulated, armoured, overall PVC sheathed with 2.5 Sq. mm stranded copper conductor.

(iv) The gland plates shall be minimum 4 mm thick. The gland plate and supporting arrangement for I/*C* power cables shall be such as to minimize flow of eddy current. In such case, gland plate shall be non ferrous metal.

(v) Sufficient space shall be provided between the power cable termination (end-boxes) and gland plate. Core accommodated within this space.

k) Ground Bus

(i) A ground bus, rated to carry maximum fault current, shall extend to full length of the switchgear.

(ii) The ground bus shall be provided with two sets of bolt drilling with G.I. bolts and nuts at each end to receive 50 x 6 mm G.I flat.

(iii) Each stationary unit shall be connected directly to the ground bus. The frame of each circuit breaker and draw out V.T. unit shall be grounded , through heavy multiple contacts at all times.

(iv) Wherever the schematic diagrams indicate a definite ground at the switchgear, a single wire for each circuit thus grounded shall be run independently to the ground bus and connected thereto.

(v) C.T. and P.T. secondary neutrals shall be earthed through removable links so that earth of one circuit may be removed without disturbing other.

l) Nameplates

(i) Nameplates of anodized aluminium shall be furnished at each cubicle and at each instrument, device mounted on or inside the cubicle with full particulars engraved thereon with white letters against black back ground..

(ii) Caution notice on suitable metal plate shall be affixed at the back of each vertical panel.

m) Space Heaters

i. Each Cubicle shall be provided with thermostat controlled anti-condensation space heaters.

ii. Space heater/s shall be trip type, rated with operation voltage of 230V, 50 Hz. AC supply unless otherwise specified.

iii. Each space heater shall be complete with a rotary type ON/OFF switch, HRC fuse in the phase, neutral link in neutral and a control thermostat.

n) A.C/ D.C Power Supply

(i) The following power supplies shall be made available at each switchgear by the, contractor:

AC. Supply : Single Feeder

D.C supply : Double Feeder

(ii) Isolating switch fuse units shall be provided at each switchgear for the incoming supplies, 4- pole, single throw for A.C. and 2-pole, double throw for D.C.

(iii) Bus-wires of adequate capacity shall be provided to distribute the incoming supplies to different cubicles. Isolating switch fuse units shall be provided at each cubicle for *AC* / D.C. supplies.

(iv) A.C. load shall be so distributed as to present a balance loading on three-phase supply system.

o) Tropical Protection

(i) All equipment, accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects & corrosion.

(ii) Screen of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

p) Painting and treatment

The panel shall have eight tank pretreatment process comprising of degreasing, rinsing, derusting, rinsing, activation, phosphating, rinsing, and passivation followed by powder coat painting having a paint thickness of 60 micron or as specified of approved shade of seimens grey (Shade RAL 7032). The powder paint will be subjected to oven heated process.

4. TESTS

The switchgear shall be completely assembled, wired, adjusted and tested at the factory

as per the relevant standards.

Routine Test

The tests shall include but not necessarily limited to the following:

a) Operation under simulated service condition to ensure accuracy of wiring, correctness of control scheme & proper functioning of the equipment.

b) All wiring and current carrying part shall be given appropriate High Voltage test.

c) Primary current and voltage shall be applied to all instrument transformers.

d) Routine test shall be carried out on all equipment such as circuit breakers, instrument transformers, relays, meters etc.

Type Test

Type test reports of similar switchgear shall be furnished.

Test Witness

All tests shall be performed in presence of *Owner's* representatives, if so desired by the Owner's. The Contractor shall given at least fifteen (15) days advance notice of the date when tests are to be carried out.

5. SYSTEM DESCRIPTION & REQUIREMENTS

System Description For 33KV HT Panels

i) System Details

a)	Voltage	:	33 / 36 KV (Nom./Max.)
b)	Nos. of Phase	:	3
c)	Frequency	:	50 Hz + 5%
d)	System Neutral	:	Non effectively earthed

ii) Insulation Level

a)	1 minute 50 Hz withstand	:	70 KV rms.
b)	Impulse withstand	:	170 KV peak

iii) Short Circuit Rating

a)	Interrupting	:	26.3 KA
b)	Withstand time	:	3 Sec.

iv) Circuit Breaker

a)	Duty Cycle	:	0-3 '-co-3'-co
b)	Breaking Current	:	26.3 kA

v)	Shunt trip coil & Closing coil	:	24V , DC thru" Battery
vi)	Auxiliary Power supply available	:	24V , DC thru" Battery
vii)	Heater/Lamp/Socket	:	415V/240V + 10% 50 Hz + 5% 3Ph./1 Ph.
viii)	Spring wound motor for circuit breaker	:	230V 1 Ph. 50 Hz

2. DRAWINGS AND INFORMATION

The Vendor shall furnish following drawings/documents in accordance with enclosed requirements:

i) General Arrangement drawing of the Switchboard, showing front view, plan, foundation plan, floor cutouts/trenches for external cables and elevations, transport sections and weights.

ii) Sectional drawings of the circuit breaker panels, showing general constructional features, mounting details of various devices, bus bars, current transformers, cable boxes, terminal boxes for control cables etc.

iii) Schematic and control wiring diagram for circuit breaker and protection including indicating devices, metering instruments, alarms, space heaters etc. Vendor drawings to be based on Purchaser's Control Wiring Diagram.

iv) Terminal plans showing terminal numbers, ferrules markings, device terminal numbers, function etc.

v) Relay wiring diagrams.

vi) Equipment List.

Vendor shall furnish required number of copies of above drawings for Purchaser's review, fabrication of switch boards shall start only after Purchaser's clearance for the same. After final review, required number of copies and reproducible shall be furnished as final certified drawings.

The information furnished shall include the following:

i) Technical literature giving complete information of the equipment.

ii) Erection, Operation and Maintenance Manual complete with all relevant information, drawings and literature for auxiliary equipment and accessories, characteristics curves for relays etc.

iii) A comprehensive spare parts catalogue.

TOOLS

One complete set of all special or non-standard tools required for installation, operation and maintenance of the switch board shall be provided. The manufacturer shall provide a list of such tools individually priced with his quotation.

SPARES

The manufacturer shall include the cost spare required for testing & commissioning for HV Switchgear.

QUALITY ASSURANCE

Quality Assurance shall follow the requirements of Owner/ Consultant as applicable.

Quality Assurance involvement will commence at enquiry and follow through to completion and acceptance thus ensuring total conformity to Purchaser's requirements.

DEVIATIONS

Deviation from specification must be stated in writing at the quotation stage.

In absence of such a statement, it will be assumed that the requirements of the specifications are met without exception.

LIST OF APPROVED MANUFACTURERS FOR HT PANEL ELECTRICAL WORKS

S.NO.	DESCRIPTION	MANUFACTURER'S NAME
1	Panel Manufacturer (33 KV)	ABB / SIEMENS / AREVA / Schneider / Tricolite / Ambit / Adlec / Advance
2	33 KV Breaker	ABB / SIEMENS / AREVA / Schneider
3	33 KV Isolator	Pentagon / Abond / Panicker / Eshwari
4	SWITCH FUSE UNIT WITH HRC FUSES	Siemens / Schneider / ABB / L & T
5	RELAYS (Numeric Type)	Siemens / Schneider / ABB
6	Current Transformers	Kappa / ECS / Pragati / AE / Kalpa
7	Voltage Transformers	Kappa / ECS / Pragati
8	Ammeters / Voltmeters and metering equipments	Siemens / Automatic Electric / Schneider / L&T / Neptune / Enercon / Secure / Rishab
9	Energy Analyser (with RS 485 port)	Siemens / Automatic Electric / Schneider / L&T / Enercon / Conzerv
10	Selector Switches	Kaycee / Salzar / L & T
11	BATTERY CHARGING PANEL	KELTRON / NELCO / VOLT STAT
12	BATTERIES	EXIDE / AMCO / STANDARD / Prestolite
13	LED Lamps	Vaishno / Siemens / L&T
14	Bus Bars	Rachna Metal / Libu Metal
15	Any Other Items	On approval of consultant or Engg in charge
NOTE :		
1	The choice of the Final makes shall be made by the owner / consultant.	

	SCHEDULE OF QUANTITIES FOR ELECTRICAL INSTALLATIONS				
	PROJECT : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA. (FOR TOWER A, B, C, 1 & 2 ONLY)				
	PART (A) - SUPPLY OF HT PANEL				
	IMPORTANT NOTE - COMPLETE ELECTRICAL SCHEME TO BE APPROVED FROM UPPCL DEPARTMENT, BEFORE START ANY DESIGNING / FABRICATION.				
S.No	**DESCRIPTION**	**QTY**	**UNIT**	**RATE**	**AMOUNT**
1	**H.V. PANEL (33 KV - VCB PANEL) (3 Way) Conventional**				
	Supply, testing & commissioning of indoor type floor mounting, dust & vermin proof, front operated construction, enclosure class - IP 4X, powder coated after proper treatment with 9 tank process, **33 KV VCB breaker panel - 01 with 3 nos VCB breakers (1 incomer and 2 out goings of fault Current Rating Shall be 25kA for 3 sec minimum and IAC (Internal Arc AFLR) shall be 25kA for 0.1sec AFLR minimum.**), totally enclosed & fully interlocked, horizontal drawout, horizontal isolation type breaker, having capacities as mentioned below, single break, trip free mechanism, motorised charged and auto closing breaker suitable for use on 33 KV, 3 Phase, 50 Hz A. C. supply, complete with self contained, fully interlocked, rack in and rack out mechanism, air insulated but encapsulated Copper alloy bus bars of suitable fault level having conductivity of 97 to 99 % , Al. earth bar, earth bar, breaker featured with mechanical ON / OFF indicator with hand trip device, spring release coil, shunt trip coil, control voltage of 24 Volt DC, TNC, LED type indicating lamps for phases and trip conditions and auxiliary switch of 6 NO + 6 NC and equipped with following switchgears and accessories.				
	The panel should be suitable for connections for up to 3 x 300 sq.mm XLPE 33 KV cable (cable entry from bottom), end termination with heat shrinkable jointing material etc. as required. (The Cost of end termination not included in this item)				
	All the Relay shall be of Numerical type, communicable with PLC through RS 485 port on Modbus and with built – in testing facilities **(All relays should be operated at Minimum 10% of total selected CT load)**				
	Makes : - **33 KV Breaker** - ABB / SIEMENS / AREVA / Schneider				
	33 KV Isolator - Pentagon / Abond / Panicker				
	Panel Manufacturer (33 KV) - ABB / SIEMENS / AREVA / Schneider / Tricolite / Ambit / Adlec / Advance				
	(**Bus Bar** :- Rachna Metal / Libu Metal)				
	Incoming - 1 Nos. 1250 Amp. VCB breakers with followings in breaker -				
	(a) 1 set (3 nos) 33 KV / v3 / 110 / v3 Volts drawout type PT Class 0.5 accuracy and 100 VA burden with 1 No. Voltmeter (0-36 KV), digital type, selector switch for voltmeter and protection fuses/MCB for HT metering.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	(b) 3 nos. dual core dual ratio CTs of ratio 150/75/1/1A of 15 VA burden and accuracy class-0.5 for metering and class 5P10 for protection. **(Note - All relays should be operated at Minimum 10% of total selected CT load)**				
	(c) 1 No. - (0-150A) Ammeter, digital type with selector switches.				
	(d) Master trip relay				
	(e) Trip circuit supervision relay				
	(f) Microprocessor based numerical relay with IDMT setting for O/L, E/F and S/C protection.				
	(g) Energy analyser (digital type) consisting of I, V, KW, KWH, KVA, KVAH, KVARH, PF, HZ & MDI with RS 485 port.				
	(h) Over and Under voltage relay.				
	(i) Timer and TNC switch				
	Total Outgoing - 2 Nos. - 630 A VCB breakers				
	Outgoing (1st) - 1 NOS 1250 A VCB breakers with followings in breaker -				
	(a) 3 nos. dual core dual ratio CTs of ratio 125/65/1/1A of 15 VA burden and accuracy class-1 for metering and class 5P10 for protection. **(Note - All relays should be operated at Minimum 10% of total selected CT load)**				
	(b) (0-125A) Ammeters, dual scale digital type & selector switches for ammeters.				
	(c) Microprocessor based numerical relay with IDMT & instantaneous element for O/L, E/F and S/C protection.				
	(e) TNC switch				
	(f) Master trip relay				
	(g) Trip circuit supervision relay				
	Outgoing (2nd) - 1 NOS - 630 A VCB breakers with followings in breaker -				
	(a) 3 nos. dual core dual ratio CTs of ratio 30/1/1A of 15 VA burden and accuracy class-1 for metering and class 5P10 for protection. **(Note - All relays should be operated at Minimum 10% of total selected CT load)**				
	(b) (0-30A) Ammeters, dual scale digital type & selector switches for ammeters.				
	(c) Microprocessor based numerical relay with IDMT & instantaneous element for O/L, E/F and S/C protection.				
	(e) TNC switch				
	(f) Master trip relay				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	(g) Trip circuit supervision relay	1	Sets		
2	Supplying, installation, testing & commissioning of **battery and battery charger** with 240 Volt AC input & 24 Volt DC continuous output with provision of boost & float charging, suitable for closing/tripping/indication of 3 Nos. HT panel boards with 2 Nos. 12 Volts each maintenance free batteries of suitable AH, charging unit, capacitor bank for emergency delivering for trip system complete with suitable capacity of Ammeter & Voltmeter i/c connections with 2.5 sq.mm FRLS insulated copper conductor cable etc. including DC DB consisting of 10 nos 32 Amp DP MCB's for DC supply distribution to panels as required.	1	Sets		
3	**H.V. PANEL (33 KV - VCB PANEL) - 02 (2 Way) Conventional (Extensible type, in future 4 way))**				
	Supply, testing & commissioning of indoor type floor mounting, dust & vermin proof, front operated construction, enclosure class - IP 4X, powder coated after proper treatment with 9 tank process, **33 KV VCB breaker panel - 02** with 2 Way HT Panel (1 incomer LBS and 1 out goings VCB) **of fault Current Rating Shall be 25kA for 3 sec minimum and IAC (Internal Arc AFLR) shall be 25kA for 0.1sec AFLR minimum.**, totally enclosed & fully interlocked, horizontal drawout, horizontal isolation type breaker, having capacities as mentioned below, single break, trip free mechanism, motorised charged and auto closing breaker suitable for use on 33 KV, 3 Phase, 50 Hz A. C. supply, complete with self contained, fully interlocked, rack in and rack out mechanism, air insulated but encapsulated Copper alloy bus bars of suitable fault level having conductivity of 97 to 99 % , Al. earth bar, earth bar, breaker featured with mechanical ON / OFF indicator with hand trip device, spring release coil, shunt trip coil, control voltage of 24 Volt DC, TNC, LED type indicating lamps for phases and trip conditions and auxiliary switch of 6 NO + 6 NC and equipped with following switchgears and accessories.				
	IMPORTANT NOTE - PROVISION FOR SPACEOF 2 NOS 33 kV VCB OF SAME SPECIFICATION AS ABOVE FOR FUTURE USE, FOR 1600 KVA TRANSFORMER & TO OTHER ESS -02, PLZ REFER SUBMITTED SLD)				
	The panel should be suitable for connections for up to 3 x 300 sq.mm XLPE 33 KV cable (cable entry from bottom), end termination with heat shrinkable jointing material etc. as required. (The Cost of end termination not included in this item)				
	All the Relay shall be of Numerical type, communicable with PLC through RS 485 port on Modbus and with built – in testing facilities **(All relays should be operated at Minimum 10% of total selected CT load)**				
	Power pack (1 working & 1 standby) with 220 Volt AC input & 24 Volt DC continuous output suitable for indicating lights & tripping(3 times) with 2 nos 12 Volts each SMF batteries of suitable AH rating , charging unit, capacitor bank , emergency delivering for trip system complete with selector switch & 1 no DC voltmeter(0-24V), ammeter, connections with 2.5 sq mm FRLS copper cables complete as required.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	Makes : - **33 KV Breaker** - ABB / SIEMENS / AREVA / Schneider				
	33 KV Isolator - Pentagon / Abond / Panicker				
	Panel Manufacturer (33 KV) - ABB / SIEMENS / AREVA / Schneider / Tricolite / Ambit / Adlec / Advance				
	(**Bus Bar** :- Rachna Metal / Libu Metal)				
	Incoming - 1 Nos. 1250 Amp. On Load Isolator with earth switch.				
	Incoming Isolators shall have be provided with one set of phase indication lamps with all protection PT's / fuses/MCB as required.				
	Outgoing - 1 Nos. - 630 A VCB breakers with followings in each breaker -				
	Note - Provide all type of Protection, Auxillary relays, release for the transformer protection as the outgoing feeders shall feeds the power to transformer.				
	There is a provision in out going VCB that should be "trip off" after REF relay activated in downstream panel after transformer.				
	(a) 3 nos. dual core dual ratio CTs of ratio 40/1/1A of 15 VA burden and accuracy class-1 for metering and class 5P10 for protection. **(Note - All relays should be operated at Minimum 10% of total selected CT load)**				
	(b) (0-40A) Ammeters, dual scale digital type & selector switches for ammeters.				
	(c) Microprocessor based numerical relay with IDMT & instantaneous element for O/L, E/F and S/C protection. (The relay having AUTO DOUBLING feature to prevent nunsense triping during Inrush current cycle of Transformer)				
	(d) 12 window Annunciation panel with necessary relays, audio and visual indicators and push buttons.				
	Oil temperature alarm and trip - 2 windows.				
	Winding temperature alarm and trip - 2 windows.				
	Buchholtz alaram and trip - 2 windows.				
	Over current and earth fault - 2 windows.				
	Pressure release valve alaram and trip - 2 windows.				
	spare window - 2 windows.				
	(e) Auxilliary relay for Buchholtz / OTI / WTI / MOG / OLTC surge with alarm & trip.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	(e) TNC switch				
	(f) Master trip relay				
	(g) Trip circuit supervision relay	1	Sets		
4	**H.V. PANEL (33 KV - VCB PANEL) - Conventional unit panel**				
	Supply, testing & commissioning of indoor type floor mounting, dust & vermin proof, front operated construction, enclosure class - IP 4X, powder coated after proper treatment with 9 tank process, **33 KV VCB panel** with 1 nos 630 amp VCB breaker, **of fault Current Rating Shall be 25kA for 3 sec minimum and IAC (Internal Arc AFLR) shall be 25kA for 0.1sec AFLR minimum.** totally enclosed & fully interlocked, horizontal drawout, horizontal isolation type breaker, having capacities as mentioned below, single break, trip free mechanism, motorised charged and auto closing breaker suitable for use on 33 KV, 3 Phase, 50 Hz A. C. supply with complete with self contained, fully interlocked, rack in and rack out mechanism, air insulated but encapsulated Copper alloy bus bars of suitable fault level having conductivity of 97 to 99 % , Al. earth bar, earth bar, breaker featured with mechanical ON / OFF indicator with hand trip device, spring release coil, shunt trip coil, control voltage of 24 Volt DC, TNC, LED type indicating lamps for phases and trip conditions and auxiliary switch of 6 NO + 6 NC and equipped with following switchgears and accessories.				
	The panel should be suitable for connections for up to 3 x 300 sq.mm XLPE 33 KV cable (cable entry from bottom), end termination with heat shrinkable jointing material etc. as required. (The Cost of end termination not included in this item)				
	All the Relay shall be of Numerical type, communicable with PLC through RS 485 port on Modbus and with built – in testing facilities **(All relays should be operated at Minimum 10% of total selected CT load)**				
	Power pack (1 working & 1 standby) with 220 Volt AC input & 24 Volt DC continuous output suitable for indicating lights & tripping(3 times) with 2 nos 12 Volts each SMF batteries of suitable AH rating , charging unit, capacitor bank , emergency delivering for trip system complete with selector switch & 1 no DC voltmeter(0-24V), ammeter, connections with 2.5 sq mm FRLS copper cables complete as required.				
	Makes : - **33 KV Breaker** - ABB / SIEMENS / AREVA / Schneider				
	33 KV Isolator - Pentagon / Abond / Panicker				
	Panel Manufacturer (33 KV) - ABB / SIEMENS / AREVA / Schneider / Tricolite / Ambit / Adlec / Advance				
	(**Bus Bar** :- Rachna Metal / Libu Metal)				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	Note - Provide all type of Protection, Auxillary relays, release for the transformer protection as the outgoing feeders shall feeds the power to transformer.				
	(a) 1 set (3 nos) 33 KV / v3 / 110 / v3 Volts drawout type PT Class 0.5 accuracy and 100 VA burden with 1 No. Voltmeter (0-36 KV), digital type, selector switch for voltmeter and protection fuses/MCB for HT metering.				
	(b) 3 nos. dual core dual ratio CTs of ratio 30/1/1 A of 15 VA burden and accuracy class-0.5 for metering and class 5P10 for protection. **(Note - All relays should be operated at Minimum 10% of total selected CT load)**				
	(c) 1 nos. (0-30A) Ammeter, digital type with selector switches.				
	(d) Master trip relay				
	(e) Trip circuit supervision relay				
	(c) Microprocessor based numerical relay with IDMT & instantaneous element for O/L, E/F and S/C protection. (The relay having AUTO DOUBLING feature to prevent nunsense triping during Inrush current cycle of Transformer)				
	(e) TNC switch				
	(j) 12 window Annunciation panel with necessary relays, audio and visual indicators and push buttons.				
	Oil temperature alarm and trip - 2 windows.				
	Winding temperature alarm and trip - 2 windows.				
	Buchholtz alaram and trip - 2 windows.				
	Over current and earth fault - 2 windows.				
	Pressure release valve alaram and trip - 2 windows.				
	spare window - 2 windows.				
	(k) Auxilliary relay for Buchholtz / OTI / WTI / MOG / OLTC surge with alarm & trip.				
	The work shall be complete in all respects up to the satisfaction of Engg-in-charge.	1	Sets		
	TOTAL				

TENDER FOR EXTERNAL ELECTRICAL WORKS
PART – B (SUPPLY OF TRANSFORMER).

NAME OF THE WORK : **"LOGIX BLOSSOM ZEST"**
AT SECTOR - 143 NOIDA (U.P.)

Architect:

Services consultant

[Consummate Engineering Services Pvt. Ltd.]

B-67, SECTOR – 67, Noida – 201301 Tel. : (0120) 2303500 (24 Lines)

Lko. Office : R 006, Rohtas Plumeria, Gomti Nagar, Lucknow,

e mail : mail@cespl.in

TECHNICAL SPECIFICATIONS OF TRANSFORMER

NAME OF THE WORK : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA (U.P.)

Architect:

Consultants
Consummate Engineering Services Pvt. Ltd.
B-67, SECTOR – 67, Noida – 201301 Tel. : (0120) 2303500 (24 Lines)
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DISTRIBUTION TRANSFORMER (OIL TYPE) – 33 KV / 0.433 KV

1. TRANSFORMER

1.1.1 Transformers (Outdoor Type)
The transformers are required for use in the sub-station. The supply voltage is stepped down from 33 KV to 433 Volt for L.T. power distribution.

1.1.2 The transformer shall be designed, manufactured & tested in accordance with the latest Indian standard specifications No. IS: 2026 (Part I), losses & temperature rise of other specification to IS 1180 (Part-1): 2014, and that of fittings to Is: 3639 – 166 transformer, oil to IS: 335 and over-loading as per IS: 6600 and also compliance to IS 3347 & 7421 . The transformers supplied shall meet the guaranteed impulse levels.

1.1.3 The transformer shall be adequately designed and effectively cooled to ensure its operation under full load conditions continuously and for short time under overload conditions. All transformers of similar rating shall have identical features & characteristics both mechanical and electrical.

1.1.4 Adequate safety devices shall be incorporated to prevent damage to transformer windings or tank due to overheating or system electrical faults. It should withstand short circuit fault level of 1500 MVA.

1.1.5 The transformer shall have optimum copper and iron losses as per IS 1180 (Part-01): 2014.

1.1.6 The transformer shall be provided with adequate inter-turn insulation and shall conform to class 'A' insulation.

1.1.7 The design shall incorporate every reasonable precaution and provision for safety of all those concerned in the operation and maintenance of the equipment keeping in view the requirements of Indian Electricity Rules. The design and manufacture of the transformers shall ensure its capability to withstand rough handling during transportation and installation. The workmanship shall be of highest grade and manufactured in accordance with the modern practice.

1.1.8 The transformer shall have a maximum continuous rating (as defined in IS:2026 / 1180, latest issue) at the secondary terminals, of the specified KVA output, at specified normal pressure, frequency, altitude and temperature rise at principal tap.

1.1.9 The transformer shall be designed to work at a standard frequency of 50 Hz.

1.1.10 Unless, otherwise specified herein or in the order the transformer shall be of double wound, 3 phase, mineral insulating oil filled, oil natural and natural air cooled, core type suitable for outdoor installation and suitable for operation in the climate prevailing at site.

1.1.11 Maximum temperature rise at the specified maximum continuous output, pressure ratio and frequency shall not exceed the limits specified in IS: 1180 Part-1 (2014) & IS 2026 (latest issue) i.e. 70°C.

1.1.12 The Buchholz relay shall be double float design, gas and oil actuated with separate electrical contacts – one for alarm and other for tripping. It shall be complete with glass windows, independent potential and reset contacts.

1.1.13 The normal no-load operating voltage ratio and the connection of the high voltage and low voltage windings shall be as specified delta on primary side and star on secondary side.

1.1.14 Connections and group symbol of the transformer, as specified, shall be according to Is: 2026 / 1180 Part-1,i.e. Dyn 11

1.1.15 High voltage phase windings shall be marked both on the terminal boards inside the tank and outside the tank with capital letters, U, V, W. Similarly the low voltage windings of the same phase shall be marked by corresponding small letters, u, v, w. The neutral point terminal being indicated by letter ‘n’.

1.1.16 The vector diagram plate shall clearly indicate the methods adopted for marking the terminals both outside and inside.

1.1.17 The terminals on L.T. sides shall be suitable for cable connection to the main L.T. switch gear. Those on H.T. side shall be suitable for 33 KV (E) insulated aluminium conductor XLPE cable of suitable size as per BOQ. Cable Terminal boxes shall be Raychem / M. Seal type air insulated box type.

1.1.18 The transformer tank and cover shall be of robust welded construction and sufficiently strong to withstand shocks likely to be encountered during transportation and installation. It shall be made of mild steel plates of adequate thickness.

1.1.19 The tank shall be made of mild steel plates as per IS: 2026, properly welded and gasketted to ensure rigid construction. It shall be able to withstand partial vacuum against standard atmospheric pressure. All weldings shall be uniform and bars to be ground for smooth surface finish.

1.1.20 All joints shall be fitted with suitable oil tight gaskets. Suitable guides shall be provided for tanking & untanking the transformer core & winding assembly.

1.1.21 All welded joints in the transformer tank as well as radiators shall be as per I.S. specifications.

1.1.22 The radiators shall be provided on the tank to facilitate cooling. These shall be provided with isolating valves at both ends. The valves shall be butterfly type (as per IS: 1228) and leak proof. The radiators shall be constructed out of 1.5mm thick pre-stressed steel of welded construction or of tubular pipe construction. Cooling radiators shall be as per IS: 6600.

1.1.23 Lifting eyes or lugs shall be provided on all parts of the transformer requiring independent handling during assembling or dismantling. In addition the transformer tank shall be provided with lifting lugs and properly secured to the side of the tank for lifting the transformer filled with oil either by crane or by jacks. The tank shall also be provided with two suitable lugs for the purpose of grounding.

1.1.24 The tank shall be equipped with gun metal valves of standard screw connections for external piping for drainage, filtering and sampling of the oil or as per manufacturer's standard.

1.1.25 The transformer tank shall be supported on a structural steel base equipped with forged steel or cast steel single flanged bi-directional rollers suitable for moving the transformer completely filled with oil. Suitable jacks for lifting the transformer for changing the plane of rotation of the bi-directional rollers shall be provided by supplier.

1.1.26 The inside and outside of the tank shall be cleaned thoroughly by chemical derusting agents and shall be coated with insulating paint or varnish.

1.1.27 The design of core should ensure low core loasses. The core shall be made of good quality cold rolled grain oriented silicon steel laminations of high permeability. It shall be coated with hot oil proof insulation and bolted together and to the frame firmly to prevent undue vibration. Its design should ensure suitability and reduce to a minimum the transformer excitation current & eddy current losses. The core shall be fully insulated from the winding.

1.1.28 All core clamping bolts shall be effectively insulated from the laminations in order to eliminate any short circuit paths, magnetic or electrical. The core clamping bolts shall be insulated with enamel or varnish or impregnated paper. The varnish should have been in successful use for at-least five years. The laminations shall be of inter board type. The bolt passing though the core shall be insulated for 2 KV.

1.1.29 The core and coil shall be properly secured to the tank such that core does not shift its position in case the transformer is shifted or during short circuit conditions.

1.1.30 The core shall be provided with lugs for lifting the complete core and coil assembly of the transformer. The core shall be effectively earthed to the tank.

1.1.31 The transformer winding shall be of high conductivity annealed copper conductor. These shall be fully insulated for rated voltage with paper of high dielectric strength, slow aging characteristics and oil resistant properties. The assembly shall be held in position under aerial thrust likely to be set up under terminal short circuits conditions. It is preferable to provide tow bushings for neutral point earthing (one inside the terminal block and one outside.).

1.1.32 The windings shall be designed to reduce to a minimum out of balance forces in the transformer. The tapping shall be reinforced with insulating tapping as required.

1.1.33 The windings shall be wound to close tolerances and the coils shall be thoroughly vacuum dried and impregnated with varnish or oil.

1.1.34 Liberal oil ducts shall be provided to ensure fluent circulation of oil and proper spacing to prevent formation of hot spot.

1.1.35 Adequate mechanical bracings of the windings shall be provided and installation shall be designed in such a manner so as to ensure a uniform voltage distribution throughout the length of the windings during surge and short circuit conditions.

1.1.36 The windings shall be clamped securely in place so that they will not be displaced or deformed during short circuits. Maximum current density in the high voltage and low voltage windings shall be clearly stated in the tender. It is essential that windings should be subjected to thorough shrinking and seasoning process so that no further shrinking occurs at site. Adjustable devices shall be provided for taking up any possible shrinking of windings in service.

1.1.37 The end turns of the high voltage windings shall be reinforced to the extent of 5% of the windings from the line ends so as to withstand abnormal transient pressure, if required.

1.1.38 The percentage of end turn insulation provided on the transformer shall be clearly stated in the tender. Whole winding of the transformer shall be fully insulated.

1.1.39 Bushing Insulators
The bushing insulators of the transformer shall be of sufficient creepage length and shall be unaffected by atmospheric conditions due to weather, dust or rapid change of temperature likely to be met at site. These should be fully glazed porcelain type. All bushings shall be marked by means of label with symbols corresponding to connection diagram indicated in the diagram plate.

1.1.40 Transformer oil

1.1.40.1 The insulating oil used in the transformer shall be mineral oil of high flash point, low sludge value, low pour point and low viscosity. It shall comply with the requirement of IS: 335 latest issue. The oil must be free from all undesirable impurities which may affect dielectric strength, flash point and cooling action. It must be tested for all the tests specified in IS:335. The transformer oil shall have a good stability against oxidation so that viscosity remains substantially unchanged during the many years of expected service life and without any sludge formation. The transformers shall be supplied topped with mineral insulating oil upto required value for putting in service. The oil shall be tested for its dielectric strength as per Is: 6792 – 1972 and should be not less than 40 KV for 60 sec. and 50 KV instantaneous.

1.1.40.2 The transformer shall be supplied with first filling of oil. 10% extra oil shall also be supplied in sealed tins for topping at the time of commissioning.

1.1.41 Regulation

1.1.41.1 The inherent regulation at normal balanced load at unity and 0.85 lagging power factor at a temperature of 75 dec. C. shall be stated in the tender and contractor shall guarantee the performance figures. The regulation of the transformers shall be as per IS:2026.

1.1.42 Centre of Gravity

The centre of gravity of the assembled transformer shall be low and as near the vertical centre line as possible. The transformer shall be stable with or without oil if centre of gravity is eccentric relative to track either with or without oil, its location shall be shown on the outline drawings.

1.1.44 Winding Temperature Indicator
The winding temperature indicating device shall be complete with current transformer a dial type thermometer with two separate sets of electrical contacts, one for alarm and other for tripping.

1.1.45 Accessories
Standard fittings as per IS 1180 Part-1, Is: 2026 and Is: 3639 shall be provided. These fittings shall include the following:

a) An oil conservator of sufficient capacity with drain cock, oil filling hole with cap.

b) Drain valve with plug or cover plate. The drain valve should be so located that the transformer can be completely drained off oil.

c) Two earthing terminals capable of carrying for 30 seconds the full load low voltage current of the transformer.

d) Oil filling hole and cap

e) Lifting lugs

f) Thermometer pocket with 4" dial type thermometer located in tank wall or covering having an internal diameter of not less than 13mm and depth of not less than 115mm, at a height not lower than the top of the core.

g) Oil level indicator with 'minimum' marking.

h) Rating plate, engraved with full details a required in Is:2026.

i) Terminal marking plate

j) Air release device on top of the tank.

k) Explosion vent.

l) Bi-directional rolers (4 Nos.)

m) Off Load tap changing switch with +5% to -10% @ 2.5% for variation of HV.

n) Buchholz relay with glass view window and alarm and trip contacts.

o) Dehydrating breather with silica gel.

p) Marshalling box a long with thermostat and space heaters.

q) Filter valve

r) Shut off valve

s) Winding temperature indicator with trip and alarm contacts.

t) 150mm oil temperature indicator with alarm and trip contacts.

u) Oil level indicated with minimum working.

v) Inspection cover

w) Jacking lugs

x) Neurtal CT as required.

y) L.V. neutral earthing bushing and supporting insulators for bringing down the earthing strip.

z) Cable terminal boxes on both H.T. and L.T. sides of the transformer and suitable for outdoor.

1.1.45.2 The relative positions of fittings shall, as far as possible, be in accordance with stipulations made in IS: 1180 / 2026, latest issue. However, the tenderer shall submit along with his tender a copy of sketch showing relative positions of various fittings of transformer offered by him.

Each transformer shall be supplied with all fittings and accessories etc. which are normally considered part of the transformer as a unit and necessary for its operation, regardless of weather all the items have been mentioned in the tender enquiry or not.

1.1.46 Fluctuation in Voltage & Frequency

The transformer shall be subjected to variation of voltage of (+) 5% to (-) 15% on HT side and of frequency up to ± 3%. However, the voltage and frequency variations should not occur simultaneously.

1.1.47 Painting

The external surface of transformer shall be painted with epoxy paint shade of IS:631.

1.1.48 Installation, Testing and commissioning

The installation, testing and commissioning shall conform to IS Code of Practice IS: 1886-1967 with latest amendment and regulations of local authorities.

When lifting a transformer care shall be taken to see that lifting chain will not interfere with any part of the transformer. Never fix the sling to any other part of the transformer except the lifting lugs. Lifting lugs, and jacking pads shall be used for lifting of the transformer. While using jacking pads utmost care shall be taken in proper application of jacks. Where transformer is dragged or pulled on sleeper or rollers the traction eyes provided at the bottom frame shall be used with suitable wire ropes and shackles. Tank cover should always be fitted lifting the tank.

The transformer shall be lifted by lugs or shackles or by any other suitable means (such as dragging on rollers) and mounted on MS channel embedded in cement concrete. Care shall be taken to see that transformer is not flitted during lifting and erection of transformer. The rollers shall be choked to prevent movement of the transformer after being positioned on the plinth. Adequate and necessary clearances from wall etc.. shall be provided as required as per IS: 1886 - 1967.

Before energising the transformer the oil must be got tested and approved from any of the Government Test House or from approved appropriate authority. The oil shall be tested in accordance with the requirement of IS - 335/1970. In case the results obtained are substandard the entire quantity of oil be replaced with the approved quality of oil and test taken again. The process shall be repeated till satisfactory results are achieved. In case of presence of foreign matter/moisture etc.. in the oil, the oil may be got filtered through oil filtration plant. The temperature of oil in the spray tank shall not exceed 80 Deg. C. during the purification process. The minimum IR valve by the end of purification process shall be atleast 20 Megohm at an oil temperature of 60 Deg. C. Topping up of oil if required shall be done with tested oil.

The insulation resistance of the winding shall be measured with 2500 V DC meggar and results shall correspond to the factory test results. The transformer shall be charged only after the above tests are conducted and approval of local authorities is obtained.

a) Transformers will be delivered without oil, filled with inert gas and without externally mounted accessories.

b) The Contractor shall place the transformer on its foundation assemble parts, erect the separate cooler banks where provided, erect the supporting structure for detachable type cable chamber, conduit and wiring connecting and filling of transformer with oil.

c) The Contractor shall arrange to fill transformer oil and also arrange for oil filtration before filling. H.V. Test/ Breakdown strength of transformer oil shall be carried out taking a sample from individual transformer and till the result is not found to satisfaction of Engineer, oil conditioning shall have to be carried out.

d) Jack for the above transformers shall have to be provided by the Contractor.

e) If vacuum oil filling in transformer is envisaged the Contractor shall arrange the necessary equipment

f) All the cable terminations and control wiring is to be carried out by Contractor.

CONTROL WIRING

The Contractor shall supply and install, test and commission all control/instruments wiring as found necessary. The job is turnkey and shall remain the responsibility of Contractor to ensure its functioning in useful and defined manner.

All the indoor control wiring shall have copper conductor and PVC insulated.

The indoor control wiring shall conform to IS : 694 for voltage grade of 1.1 KV for A.C./230 V for D.C.

The conductor cross sectional are shall not be less than 2.5 Sq.mm.

The indoor wiring shall be in surface conduit neatly placed on wall or ceiling either in horizontal or vertical run.

The control wiring which are to be placed outdoor or which are to run in cable trench shall be of 650/1100 voltage grade and shall conform to IS: 1554. The cable shall have minimum dia of conductor to 2.5 sq.mm.

VECTOR GROUP

Transformer shall have vector group of Dyn 11

TESTS:

Transformers shall be subjected to routine & type tests as specified in IS 2026, IS 11171 iec – 726 & given below:

Routine tests:

a) Turns ratio measurement at various taps

HV and LV winding resistance

Checking of vector group

Insulation Resistance Test

No Load Loss & No Load current measurement.

Measurement of Load losses at 25%, 50%, 75%, 100% & 110%.

Impedance voltage and impedance.

Separate source voltage withstand test

Induced over voltage withstand test

Partial discharges 25 PC upto 1.2 times of the rated voltage.

Heat Run Test

Type tests:

a) Impulse voltage withstand test

b) Short circuit test.

c) Measurement of acoustic noise level.

d) Leakage Test (tank).

The power frequency test voltage for the secondary winding shall be 2.5 KV R.M.S. The transformer shall be charged only after the tests are conducted and approval of local authorities is obtained.

Tenderer may submit type test certificates conducted on similar rated transformers for bid validation.

TESTING AND INSPECTION

a) The Contractor shall draw up and carry out a comprehensive inspection and testing programme during manufacture and commissioning of the transformer. The programme shall be duly approved by the Consultant.

b) Contractor shall ensure that type tested equipment is only offered and routine test shall be conducted as per relevant standards in presence of Client representative.

DRAWING AND INFORMATIONS

The vendor shall furnish following drawings/documents in accordance with enclosed requirement.

a) General arrangement of transformer.

b) General arrangement of HV cable box with connection diagram.

c) General arrangement of LV bus-duct and connection arrangement.

d) General arrangement of marshalling box and wiring diagram.

e) Rating and diagram plate indicating % impedance etc.

f) Type test and guaranteed technical parameters.

g) Reactance, resistance and capacitance.

h) **The initial charging current (in rush current).**

i) **Calculation for transformer such as core sizing, flux density, turn ratio & sizing of transformer.**

QUALITY ASSURANCE

Quality Assurance shall follow the requirements of Client/Consultant as applicable. Quality assurance involvement will commence at enquiry and follow through to completion and acceptance thus total conformity to Purchaser's requirements.

DEVIATION

Deviation from specifications must be stated in writing at the quotation stage.

In the absence of such a statement, it will be assumed that the requirements of the specifications are met without exception.

TECHNICAL DATA SHEET (TRANSFORMER)			
S.No	**DESCRIPTION**	**UNIT**	**QUOTED DATA**
1	Name of Manufacturer		
2	General Description		
3	Reference Standard		
4	Installation		
5	Duty		
6	Application		
7	Altitude	m	
8	Rated Power (based on AN Cooling)	KVA	
9	Rated No-Load Voltage Rtaio (HV / LV)	KV	
10	Rated Frequency	Hz	
11	Number of Phases	Nos.	
12	Material of Winding (HV / LV)	---	
13	Vector Group	---	
14	Connection (HV / LV)	---	
15	Tapping		
16	Type of Tap Changer	---	
17	Tapping Range / Tap step	---	
18	No. of Steps	Nos.	
19	For HV Variation / LV Variation	---	
20	Class of Insulation	Class	
21	Method of Cooling	---	
22	Avg. Temp. Rise of Winding	Deg.C	
23	Ambient Temp. (+15% of IS Tol. / Mini. Year / Day)	Deg.C	
24	Invironment / Climatic / Fire Behaviour class		

TECHNICAL DATA SHEET (TRANSFORMER)			
S.No	**DESCRIPTION**	**UNIT**	**QUOTED DATA**
25	No-Load Loss at Rated Voltage & Frequency (Max.)	KW	
26	Full-Load Loss at Rated Current, at 75 Deg. C & at Principal Tap (Max.)	KW	
27	Total Loss at Rated Voltage at Principal Tapping, Rated Frequency, at 75 Deg. C & at 50% load (Max.)	KW	
28	Total Loss at Rated Voltage at Principal Tapping, Rated Frequency, at 75 Deg. C & at 100% load (Max.)	KW	
29	% Impedance at Rated Current, at 75 Deg. C & at Principal Tap (+10% of IS Tol.)	%	
	A. Reactance	%	
	B. Resistance	%	
30	No-Load Current at Rated Voltage & Frequency (as % of F.L.R.C.)(+30% IS Tol.)	%	
31	Efficiencies at 75 Deg. C at Unity Power Factor (Reference Value)		
	a) At Full Load	%	
	b) At 3/4 Full Load	%	
	c) At 1/2 Full Load	%	
32	Regulation at Full Load at 75 Deg. C		
	a) At Unity Power Factor	%	
	b) At 0.8 Power Factor (Lagging)	%	
33	BIL (Insulation Level):		
34	Full Wave Lightning Impulse Withstand Voltage (HV / LV)	kV peak	
35	Separate Source Power-Frequency Voltage Withstand (HV / LV)	kV rms	

TECHNICAL DATA SHEET (TRANSFORMER)			
S.No	**DESCRIPTION**	**UNIT**	**QUOTED DATA**
36	Enclosure	---	
37	Degree of protection of Enclosure	IP	
38	Termination Arrangements		
39	HV	---	
40	LV	---	
41	Orientation Between HV & LV	Deg.	
42	Weights (Approx.)		
	Core & Winding	Kg.	
	Enclosure & Fitting	Kg.	
	Total Weight	Kg.	
43	Over-all Dimensions (Approx)		
	Length	mm	
	Breadth	mm	
	Height (With base channel)	mm	
44	Fittings / Accessories	---	
45	List of Tests to be conducted at Manufacturer's Works		
46	Noise Level when measured at 1 Meter Distance	dB	

	SCHEDULE OF QUANTITIES FOR ELECTRICAL INSTALLATIONS				
	PROJECT : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA. (FOR TOWER A, B, C, 1 & 2 ONLY)				
	PART (B) - SUPPLY OF TRANSFORMERS				
	IMPORTANT NOTE - COMPLETE ELECTRICAL SCHEME TO BE APPROVED FROM UPPCL DEPARTMENT, BEFORE START ANY DESIGNING / FABRICATION.				
S.No	**DESCRIPTION**	**QTY**	**UNIT**	**RATE**	**AMOUNT**
1	**<u>TRANSFORMER (33 KV / 0.433 KV)</u>**				
	Supply, testing & commissioning of **Outdoor mounted type 33 KV / 433 Volt Transfomer** (as per IS : 2026, P1 to P5, IS: 1180 Part-01, IS: 7421 & IS: 3347), 3 phase, 6.25 % impedance, , Dyn 11 vector group, 50 cycles, (ONAN) oil immersed naturally cooled, step down, copper wound, continuous duty, temperature rise above 50^{o}C in oil by thermometer 40^{o}C, in winding by resistance 45^{o}C (as per IS 1180 part-1) and other standard accessories as required including followings :				
	The Transformer losses should confirm to IS - 1180 Part-1 (2014)- Amendment No. 04 March 2021 with energy efficiency level 1 [for 2000 KVA i.e. 5.05 KW at 50% load & 15.0 KW at 100% load shall not exceeds 7.5% of the maximum total loss values				
	Make : - Crompton / Kirlosker / Schneider / Voltamp / Sudhir Intra.				
	a) Cable Termination box with disconnecting facility for 33 KV 3C-300 sq mm XLPE cable at HT side				
	b) Cable Termination box with disconnecting facility for required nos. LT cable at LT side.				
	c) Off circuit Tap Changer on HV side + 5 % to - 10 % @ 2.5 % in manual mode with position indicator and locking arrangements.				
	d) Bidirectional rollers.				
	e) Oil Conservator with filter cap, drain plug & oil level gauge				
	f) Earthing terminals 2 nos for body earthing.				
	g) 0.433 KV neutral seperately bought out on a bushing for neutral earthing.				
	i) Pressure release device. Double diaphragm explosion vent.				
	j) Radiators Detachable type with top & bottom shut off valve.				
	k) First filling of filtered dehydrated oil as per IS : 335 including make up fill during installation & 10% extra.				
	l) Silica gel breather with connecting pipe & oil seal.				
	m) Rating, Diagram & Terminal marking plate of SS.				
	n) Sampling Valves for filteration, drainage and filling with plugs.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	o) Air release plugs.				
	p) Thermometer pocket with plug.				
	q) Lifting Lugs.				
	r) Double float Buchholz relay with gas release cock, alarm & shut off valve on either side with separate set of contacts for trip and alarm.				
	s) 150 mm Winding temperature indicator (WTI) with alarm.				
	t) 150 mm Oil temperature indicator (OTI) with alarm				
	u) Marshalling Box.				
	v) Clamping device.				
	w) Jacking Pads.				
	x) Ladder with safety device for access to the top of transformer tank.				
	The work shall be complete in all respects up to the satisfaction of Engg-in-charge.				
	2000 KVA	1	Sets		
	TOTAL				

TENDER FOR EXTERNAL ELECTRICAL WORKS
PART – C (SUPPLY OF PANELS).

NAME OF THE WORK : **"LOGIX BLOSSOM ZEST"**
AT SECTOR - 143 NOIDA (U.P.)

Architect:

Services consultant

Working Together To Create Value

[Consummate Engineering Services Pvt. Ltd.]

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TECHNICAL SPECIFICATIONS OF PANELS

NAME OF THE WORK : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA (U.P.)

Architect:

Consultants
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L. T. PANEL

1. CONSTRUCTION FEATURES

a) Panels shall be indoor, metal clad, modular construction, fix type (except circuit breaker cubicles) air insulated and floor mounted type.

b) Unless otherwise mentioned, panels shall be of single front construction and shall be of dead front type.

c) All panels shall be extensible on both sides.

d) All panels shall be dust proof and vermin proof.

e) The panels shall have horizontal Bus bar Chamber at top of the panel even for top cable entry.

f) All panels shall have provision for cable entry from top or from bottom or both as required. The same shall be confirmed to the Vendor during detailed engineering ! approval of shop drawing of panel manufacturer.

g) All panels including capacitor panels shall be fully compartmentalized with metal! insulating partitions between individual compartments.

h) The Horizontal bus bar chamber shall be separate & totally enclosed.

i) Minimum thickness of CRCA MS sheet member shall be 1.6 mm for non load bearing members and 2.0 mm for load bearing members.

j) All panels shall comprise a continuous line up of dead front, free standing vertical sections. The installation of circuit breakers shall be limited to the bottom two tiers only. In two tiers formation two nos. of up to 1000 Amp. breakers can be provided.

k) All doors and cutouts shall be provided with neoprene gaskets.

l) The back doors of the panels shall be double door leaf type where the panels have more than 400 mm width.

m) All doors shall be supported by strong concealed type hinges.

n) All relays, meters, and switches etc. shall be flush mounted type.

o) All incoming terminals shall be provided with shrouds. Supports / shrouds shall be transparent and shall be made of SMC / DMC material. However Bakelite Hylam material is not acceptable and shall not be used any where in panels.

p) The complete structure shall be rigid, self supporting free from vibration, twists and bends etc.

q) The panels housing circuit breaker feeders shall be in single front draw out execution. The incoming & bus coupler circuit breaker feeders shall be in single tier formation while the outgoing circuit breaker feeders may be in double tier formation, unless otherwise specified.

r) A suitable barrier shall be provided between the circuit breaker and the associated control.

s) The number of modules shall be so decided that the cable alleys are not over crowded. However the number of module in any panel shall not exceed six. The minimum size of module shall be 300mm and 225mm for starter and switch fuse / MCCBs feeders respectively. The minimum clear width of cable alley shall be 300mm.

t) In cable alley, outgoing terminals shall be identified with feeder number.

u) The panel shall be provided with three phase buses and neutral bus bars of aluminium sections throughout the length of the panel and shall be adequately supported and braced to withstand the stresses due to the short circuit Rating of bus bar shall be as per SLD & BOQ for 1 sec. Maximum temperature rise of bus bars and bus bar connection while carrying rated current shall not exceed 40 C over an ambient temperature of 50 C. Bus bar sizing calculation shall be submitted for approval before start of fabrication..

v) The maximum height of the Panel should not exceed 2100 mm unless specifically approved for suitable site conditions.

2 BUS AND BUS TAPS

a) The main buses and connection shall be of high electrolytic grade of aluminium bus bars of conductivity of 57 to 58% aluminium 1 aluminium alloy (Grade EC-91 E), sized for specified current ratings with max, temp. limited to 85 deg. C (35 deg. above 50 deg. ambient temp.).

b) Vertical bus bars shall be designed depending upon the actual feeder requirement. Bimetallic connector shall be provided for connection between dissimilar metals.

c) Bus bars and connections shall be fully insulated for working voltage with adequate phase 1 ground clearances. Insulating sleeves for Bus bars and shrouds for joint shall be provided. Minimum clearance of 32 mm is required between phases and 26 mm between phase & earth.

d) Shrouds for bus bars joints / tapping points shall be of fiber glass only. Bus insulators shall be flame retardant, track resistant type with high creepage surface and of non-hygroscopic material such as epoxy / SMC / DMC.

e) Bus bars shall be supported and braced to withstand the stresses due to max. short circuit current and also to take care of any thermal expansion. .

f) The bus bar size shall be of similar size as of bus duct.

3 CHANGEOVER SWITCHES

a) Changeover switches shall be 4 pole, heavy duty, group operated load break fault make type with AC 23A duty.

b) The switches shall be capable of successfully withstanding the thermal stress for one sec. caused by the short circuit corresponding to the fault level specified.

c) The switches shall be able to withstand mechanical stresses caused by the peak short circuit currents corresponding fault level specified.

d) The switches shall be provided with operating handle compartment door and shall be so interlocked that on the hinged compartment door and shall be so interlocked that :
   i) The door can be opened only when the switch is in OFF position.
   ii) It shall not be possible to close the switch when the door is open.

e) The switch shall be provided with pad-locking arrangement for 250A and above rating.

f) The switch shall be provided with defeat interlock facilities.

4 FUSES

a) All fuses shall be HRC cartridge link type.

b) The fuses shall be provided with visible indication when they have operated.

c) Rating of the fuses shall be so chosen so as to have co-ordination with switch. Fuses shall preferably mounted directly on plug in type fuse bases & sufficient number of insulated fuse pullers shall be supplied.

d) Fuses and links functionally associated with the same circuit shall be mounted side by side.

Earthing and neutral links in main supply circuits shall be of silver plated copper & of bolted pattern.

5 CONTACTORS

a) Contactors shall be of double break, single throw and electromagnetic and non-gravity type.

b) Contactors shall be suitable for interrupted duty and shall be rated for class AC-3 duty.

c) Main contacts of contactors shall be silver faced.

d) Operating coils of contactors shall be suitable for operation on 220/240V AC, 1 phase, 50 Hz supply.

e) Contactors shall be provided with at least two pairs of 'NO' and 'NC auxiliary contacts.

f) Contactors shall not drop out at voltages down to 70% of coil rated voltages and min. pick up voltage shall be 85%.

6 OVERLOAD RELAYS

a) Overload protection for each motor feeder (wherever required) shall be provided by thermal overload relay on each of the three phases.

b) The relay shall be duly compensated against fluctuations on ambient temp. and frequency and shall have single phasing preventer feature.

c) Relay shall be hand reset type from the front of the cubicle door.

Overload relay for fan applications shall be of heavy duty type with provision of bypassing the same during starting of the fan.

7 CAPACITORS

a) The capacitor shall be of mixed dielectric type rated for 440Volts. Capacitors shall be provided with discharge resistors. The value of discharge resistors should be such that the residual voltage be less than 50V in one minute.

b) Capacitors shall be suitable for prolonged operation at an rms. voltage between terminals not exceeding 1.10 times the rated voltage, excluding transients.

c) Capacitors shall be suitable for continuous operation at an rms. line current not exceeding 1.30 times the current which occurs at rated sinusoidal voltage and rated frequency excluding transients.

d) The maximum continuous reactive output of a capacitor (including any due to flow of harmonic currents) shall not exceed 30% over rated reactive output of a capacitor.

e) Loss in the capacitors shall be kept as low as possible. (Max. 0.5W/KV AR).

f) Wherever capacitor consists of several elements inside the units, each element shall be provided with individual fuses, so that the unit need not be discharged or disconnected (although with moderate reduction in output), if one of short circuit to any of the elements.

8 AUTOMATIC POWER FACTOR CONTROL RELAY

a) Automatic Power factor control relay (APFCR) shall operate its auxiliary relay by sensing the power factor of the plant thru' current and voltage signals.

b) APFCR shall have no. of steps specified in drawings.

c) APFCR shall be provided with Built in PF meter (0.5 lag to 0.5 lead), calibrated setting dial.

d) APFCR shall be suitable for 5A secondary current.

e) APFCR shall be suitable for flush mounting in capacitor panel/MCCs.

f) Current rating of its auxiliary relay shall be compatible with switching and continuous energization of main contactor of capacitors. Otherwise, additional relay shall be provided.

9 COOLING

a) All the Capacitor Panels shall be properly ventilated. If required a small exhaust fan of suitable rating shall be provided on the rear door of the panel, with the opening properly covered with fine wire mesh. The fan shall start/stop automatically along with normal start/stop provision.

b) Louvers shall be provided on the door on rear side with a fine wire mesh.

10 CURRENT TRANSFORMERS

a) Current Transformers shall be cast - resin type .AII secondary connections shall be brought out to terminal blocks where connection will be made.

b) Accuracy class of the current transformers shall be :
   (i) Class 5P20 for protection.
   (ii) Class 1.0 for metering.
   (iii) Class PS for differential Protection & REF.

c) Current transformer shall be provided with test links and shorting on both secondary leads for testing purpose.

d) All current transformers shall be earthed by a separate earth link on terminal blocks.

e) Additional name plate of CTs / PTs shall be provided (if required) at such a place that it shall be possible to find out details of CTs / PTs after mounting in the panel.

11 VOLTAGE TRANSFORMERS

a) Voltage transformers shall be cast-resin, fixed type and shall have an accuracy class of 1.0.

b) Low voltage fuses, sized to prevent overload, shall be installed in all ungrounded secondary leads. Fuses shall be suitably located to permit easy replacement while the board is energized.

12 RELAYS

Relays wherever provided shall be of draw-out design with built-in testing facilities. Small auxiliary relays may be in non-draw out execution-.

13 CONTROL AND SELECTOR SWITCHES

a) Control and selector switches shall be of rotary type having enclosed contacts, which are accessible by the removal of cover.

b) Control and selector switches shall be of flush mounted type and on front of panels. .

c) Selector switches shall be of stay-put maintained contact type.

d) Control switches shall be provided with escutcheon plate clearly marked to show the position.

14 INDICATING METERS AND INSTRUMENTS

Indicating instrument (96 x 96 mm) shall be digital meter, switch board type and accuracy class of.! (1 % full scale ± 1 count).

15 INDICATING LAMPS

a) Indicating lamps shall be of LED type, low watt consumption and provided with appropriate value of resistors. The LEDs shall also have an in-built surge suppressor.

b) Bulbs and lenses shall be interchangeable and easily replaceable from the front of the panel.

16 PUSH BUTTONS

a) All push buttons shall be of the push to actuate the contact type.

b) All push buttons shall be oil tight and shall be provided with adequate no. of contacts.

17 POWER AND CONTROL CABLE TERMINATION

a) Suitable supporting arrangement shall be provided for all power and control cables entering the panel.

b) Removable undrilled gland plate of 3 mm thick of MS for multicore cables and 4mm thick of Aluminium for single core cables sufficient in size to accommodate all compression type, heavy duty brass glands shall be provided.

c) Adequate termination arrangement shall be provided for all power cables which shall be aluminium / copper conductor, PVC insulated, sheathed, armoured PVC sleeved overall, heavy duty cables, 1.1 KV grade. Power cables termination shall be by means of crimping type lugs on conductor cables.

d) The terminal blocks shall be bolted lug type for cables. These shall be protected type and rated for 1100 Volts service. The minimum current rating of terminal block shall be 16 Amp. The construction shall be such that after the connection of cable by means of lugs, necessary clearance and creepage distance are available.

e) Wherever there is more than one equipment connected on the same feeder, separate terminals shall be provided.

18 INTERNAL WIRING

a) All internal wring shall be carried out with stranded copper conductors, PVC insulated, 1100/650 V grade.

b) Min. size of conductor 2.5 sq. mm for AC control wiring and 4.0 sq. mm. for DC control wiring. Current transformer secondary wiring shall be with 2.5 sq. mm conductor.

c) All wiring shall be run on the sides of the panels and shall be neatly bunched and shall not affect access to equipment mounted in the panels.

d) Wiring shall be terminated on terminal blocks using crimping type lugs and without joints or tees on their runs.

e) Power wiring shall be done either by phase identifying colored wires and suitably colored PVC sleeves shall be provided at each end of wire.

The following wiring codes shall be used.

Instrument Transformer	:	Red, yellow or blue depending upon phase with which wire is associated.
A-C phase wire	:	White
A-C Neutral wire	:	Black
Earth connection	:	Green

f) PVC identification ferrules, yellow colour with black engraved letter shall be provided at each end of all control wires marked to correspond with equipment designation & termination numbers.

g) Ferrules provided shall be oil tight and numbered from left to right.

19 TERMINAL BLOCKS

a) Terminal blocks for control wiring shall be 650V grade 10 sq. mm size.

b) Terminal blocks shall be grouped depending on circuit voltage. Different voltage groups of terminals blocks shall be segregated.

c) Terminals blocks shall be numbered for identification and provision shall be provided for terminal labels.

d) Terminal blocks requiring duplication shall be provided with solid bonding links.

e) Terminal blocks for current transformer secondary lead wires shall be provided with shorting, disconnecting / earthing facilities.

f) Terminal blocks and control wiring shall be so arranged that only one conductor of external wiring required to be terminated in at each terminal.

20 GROUND BUS

a) A ground bus, rated to carry maximum fault current, shall extend to full length of the panel.

b) The ground bus shall be provided with two-bolt drilling with GJ. bolts and nuts at each end to receive up to 75X 10 mm G.I. flat. .

c) Each stationary unit shall be connected directly to the ground bus. The frame of each circuit breaker and shall be grounded through heavy multiple contacts at all times.

d) Wherever the schematic diagrams indicate a definite ground at the switchgear, a single wire for each circuit thus grounded shall be run independent to the ground bus and connected thereto.

e) C.T. shall be earthed through removable links so that earth of one circuit may be removed without disturbing other.

f) Frames and non current carrying metal parts of all equipment mounted shall be effectively to earth bus.

g) All hinged doors shall be connected to earth bus by flexible tinned bare copper wire.

h) Instrument and relay cabinets shall be connected to earth by 2.5 sq. mm stranded copper insulated wire 1100 V grade.

21 SPACE HEATERS

Each cubicle shall be provided with thermostat controlled space heaters.

22 AC/DC POWER SUPPLY

a) The panels shall be suitable to receive following power supplies.
AC Supply : Single Feeder
DC Supply : Double Feeder

b) Isolating switch fuse units shall be provided at each switchgear for the incoming supplies, 4-pole, single throw for AC.

c) Bus-wires of adequate capacity shall be provided to distribute the incoming supplies to different cubicles. Isolating switch-fuse units shall be provided at each cubicle for AC supplies.

d) AC load shall be so distributed as to present a balance loading on three phase supply system.

23 NAME PLATES

a) Name plates of anodized aluminium shall be furnished at cubicle and at each instrument, device mounted on and inside the cubicle.

b) Caution notice on suitable metal plate shall be affixed at the back of each vertical panel.

c) Name plates for feeders shall be provided on front and back of the panel.

24 TROPICAL PROTECTION

a) All equipment, accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.

b) Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

25 PAINTING AND TREATMENT

The panel shall have eight tank pretreatment process comprising of degreasing, rinsing, derusting, rinsing, activation, phosphating, rinsing, and passivation followed by powder coat painting having a paint thickness of 60 micron or as specified of approved shade of seimens grey (Shade RAL 7032). The powder paint will be subjected to oven heated process.

26 TESTS & INSPECTION

After completion of all work at the manufacturer's works the switchboards shall be inspected and tested in presence of Purchaser's representative. However, stage inspection may be carried out from time to time to check progress of work and workmanship. The following tests shall be carried out:

i) All routine tests specified in relevant Indian/British Standards shall be carried out on all circuit breakers.

ii) Test for protective relay operation by primary or secondary injection method.

iii) Operation of all meters.

iv) Secondary wiring continuity test

v) Insulation test with 1000 Volts megger, before and after voltage test.

vi) HV test on secondary wiring and components on which such test is permissible (2 KV for one minute)

vii) Simulating external circuits for remote operation of breaker, remote indicating lights and other remote operations, if any.

viii) Measurement of power required for closing/trip coil of the breaker.

ix) Pick up and drop out voltages for shunt trip and closing coils.

x) CT Polarity test.

Vendor shall provide all facilities such as power supply, testing instruments and apparatus required for carrying out the tests. Required copies of test certificates for all the tests carried out along with copies of type test certificates and certificates from Sub-Vendor for the components procured from them are to be submitted before dispatch of switch boards.

27. DRAWINGS AND INFORMATION

The Vendor shall furnish following drawings/documents in accordance with enclosed requirements:

i) General Arrangement drawing of the Switchboard, showing front view, plan, foundation plan, floor cutouts/trenches for external cables and elevations, transport sections and weights.

ii) Sectional drawings of the circuit breaker panels, showing general constructional features, mounting details of various devices, bus bars, current transformers, cable boxes, terminal boxes for control cables etc.

iii) Schematic and control wiring diagram for circuit breaker and protection including indicating devices, metering instruments, alarms, space heaters etc. Vendor drawings to be based on Purchaser's Control Wiring Diagram, if furnished.

iv) Terminal plans showing terminal numbers, ferrules markings, device terminal numbers, function etc.

v) Relay wiring diagrams.

vi) Equipment List.

Vendor shall furnish required number of copies of above drawings for Purchaser's review, fabrication of switch boards shall start only after Purchaser's clearance for the same. After final review, required number of copies and reproducible shall be furnished as final certified drawings.

The information furnished shall include the following:

i) Technical literature giving complete information of the equipment.

ii) Erection, Operation and Maintenance Manual complete with all relevant information, drawings and literature for auxiliary equipment and accessories, characteristics curves for relays etc.

iii) A comprehensive spare parts catalogue.

TOOLS

One complete set of all special or non-standard tools required for installation, operation and maintenance of the switch board shall be provided. The manufacturer shall provide a list of such tools individually priced with his quotation.

SPARES

The manufacturer shall provide with his quotation separate priced list of recommended commissioning and operation spares. Commissioning spares (list of which shall be approved) shall be purchased with the main HV Switchgear.

QUALITY ASSURANCE

Quality Assurance shall follow the requirements of Owner/ Consultant as applicable.

Quality Assurance involvement will commence at enquiry and follow through to completion and acceptance thus ensuring total conformity to Purchaser's requirements.

DEVIATIONS

Deviation from specification must be stated in writing at the quotation stage.

In absence of such a statement, it will be assumed that the requirements of the specifications are met without exception.

SWITCHGEAR AND CONTROLGEAR

1. GENERAL ASPECTS :-

i. All items of switchgear and distribution boards (DB' s) shall be metal clad type.

ii. The types, rating and/or categories of switch gear and protective gear shall be as specified in the tender schedule of work.

iii. RCCB's and RCBO's where specified, shall conform to the requirements of current rating, fault rating, single phase or three phase configuration and sensitivity laid down in the tender documents.

iv. While each outgoing way of distribution board (D.B.) shall be of miniature circuit breaker (MCB) as specified, and of suitable rating on the phase conductor, the corresponding earthed neutral conductor shall be connected to a common neutral terminal block and shall be capable of being disconnected individually for testing purpose.

v. **Independent earth terminal block.**

Every distribution board (single phase as well as three phase) shall have an earth terminal block identical to, but independent from neutral terminal block, to enable termination of protective (loop earthing) conductors (incoming as well as out goings) individually by screwed connection and without twisting.

vi. Earthing terminal (1 for single phase and 2 for three phase) shall be provided on the metal cladding of switches and D.B.' s for body earthing. These shall be suitably marked.

vii. Knock out holes, with or without end plates as per standard design of manufacturers, shall be provided in the metal cladding of switches and D.B.' s for termination of conduits/cables.

viii. Each distribution board shall be provided with a circuit list giving details of each circuit which it controls and the current rating of the circuit, and the size of the fuse element.

2. MCB TYPE DISTRIBUTION BOARDS (MCB DB) :-

i. MCB DB' s may be of single phase, three phase (horizontal type) suitable for feeding single phase loads or 3 phase (vertical type) suitable for feeding single phase as well as three phase loads, each phase isolation type three phase DB in which each phase can be isolated by a separate circuit breaker or RCCB, as specified. These shall be complete with accessories, but without MCB' s, which shall be specified as a separate item in the tender documents.

ii. The current ratings and the number of ways shall be as specified. Blanking plates shall be provided to close unused ways. These shall be indicated as a separate item in the Schedule of work.

iii. MCB DB' s shall be of surface/flush mounting pattern according to the requirement of their location, and shall be suitable to accommodate MCB' s and MCB type isolators and RCCB (ELCB) at incoming in single pole or multi pole configuration, as required.

i. MCB DB's shall be double door type, dust and vermin proof conforming to IP 43 or as per BOQ, and shall be fabricated out of CRCA sheet steel, minimum 1.2 mm thick, with stove enameled paint finish.

v. In case of Concealed / Recessed D.B.'s, the DB should have metallic collar for zero error installation, however, cutting of brick work, providing suitable lintel, making good the wall including plastering etc. with necessary civil work including all Civil material shall be included in contractor's scope for proper completion of work.

vi. MCB DB' s shall have removal type end plates with knock-outs at the bottom and top, and shall have hinged covers with locking arrangement.

vii. Only the knobs of the MCB' s shall protrude out of the front covers through openings neatly machine made for the purpose.

viii. The bus bars used shall be solid electrolytic copper of appropriate sections.

ix. Din bar(s) shall be provided for mounting the MCB' s.

x. The complete board shall be factory fabricated and shall be duly pre-wired in the works, ready for installation at site.

xi. The board shall be fully pre wired with single core PVC insulated copper conductors/insulated solid copper links, and terminated on to extended type terminal connectors, suitable for connections to the sizes of the respective conductors.

xii. All incoming and outgoing wiring to the pre wired MCBDB' s shall be terminated only in the extended terminal connectors to be provided within the DB. The terminal connectors shall therefore be so provided as to facilitate easy cable connections and subsequent maintenance.

3. MCCB TYPE DISTRIBUTION BOARDS (MCCB DB) :-

i. All MCCB DB' s shall be of three phase suitable for feeding single phase loads or 3 phase loads through SP/TP MCB's, IP 43 enclosure, sheet steel, double door with tinned copper bus bar, neutral bar, earth bar, knock outs etc. The DB's shall be original factory fabricated of approved make.

ii. The current ratings of Incomer MCCB shall be upto 250 amp and the number of ways shall be as specified. Blanking plates shall be provided to close unused ways.

iii. MCCB DB shall be of surface/flush mounting pattern according to the requirement of their location, and shall be suitable to accommodate Four pole MCCB at incomer and SP/TP MCB's at outgoings, as required.

ii. MCCB DB's shall be dust and vermin proof conforming to IP 43, and shall be fabricated out of CRCA sheet steel, minimum 1.3 mm thick, with stove enameled paint finish.

v. In case of Concealed / Recessed D.B.'s, the DB should have metallic collar for zero error installation, however, cutting of brick work, providing suitable lintel, making good the wall including plastering etc. with necessary civil work including

all Civil material shall be included in contractor's scope for proper completion of work.

vi. MCCB DB' s shall have removal type end plates with knock-outs at the bottom and top, and shall have hinged covers with locking arrangement.

viii. The bus bars used shall be solid electrolytic copper of appropriate sections.

ix. Din bar(s) shall be provided for mounting the MCB' s.

4. WORKMANSHIP :-

i. Good workmanship is an essential requirement to be complied with. The entire work of manufacture/fabrication, assembly and installation shall conform to sound engineering practice.

ii. The work shall be carried out under the direct supervision of a first class licensed foreman, or of a person holding a certificate of competency issued by the state Government for the type of work involved, employed by the contractor, who shall rectify then and there the defects pointed out by the Engineer-in-charge during the progress of work.

5. COMMISSIONING ON COMPLETION :-

Before the workman leaves the work finally, he must make sure that the installation is in commission, after due testing.

6. COMPLETION PLAN AND COMPLETION CERTIFICATE :-

i. For all works completion certificate after completion of work shall be submitted to the Engineer-in-charge.

ii. Completion plan drawn to a suitable scale in tracing cloth with ink indicating the following, along with three blue print copies of the same shall also be submitted.

a) General layout of the building.

b) Locations of main switch board and distribution boards, indicating the circuit numbers controlled by them.

c) Position of all points and their controls.

d) Types of fittings, viz. fluorescent, pendants, brackets, bulkhead, fans and exhaust fans etc.

e) Name of work, job number, accepted tender reference, actual date of completion, names of Division/Sub-Division and name of the firm who executed the work with their signature.

7. ADDITION TO AN INSTALLATION :-

An addition, temporary or permanent, shall not be made to the authorised load of an existing installation until it has been definitely ascertained that the current carrying capacity and the condition of the existing accessories, conductors, switches etc affected, including those of the supply Authorities, are adequate for the increased load.

CIRCUIT BREAKERS

A. MINIATURE CIRCUIT BREAKERS (MCB) :-

Miniature Circuit Breakers (MCBs) are to be used in final power distribution and branch circuits, as well as control circuits for effective protection against overload and short-circuit protection. These shall conform to latest Indian and / or International Standards,

IS : 8828-1996, IEC : 60898-1995

Miniature circuit breakers shall be quick make and break type for 240/415 V AC, 50 Hz application with magnetic thermal release for over current and short circuit protection.

The breaking capacity shall not be less than 10kA at 415V AC.

MCBs shall be C-curve type and DIN mounted.

The offered MCBs should be 'ISI' marked. 'ISI' marking on the MCB should be clearly displayed (printed) on the MCB. It should not be displayed by pasting stickers or printing. Name of the manufacturer shall also be printed clearly on body of MCB. Also make and brand shall be clearly identified on each MCB.

Technical Features

- **Isolation** : to ensure complete electrical Isolation of downstream circuit or equipment , when the MCB is switched OFF (to be marked on the MCB in symbolic form)
- **IP 20 Degree of Protection** : to prevent electrical shocks by accidental touch to any live parts, by providing finger touch proof terminals.
- **Positive Contact Indication** : In accordance with IEC-60947-2, MCBs for this characteristic shall have positive contact indication, so that in the event of accidental contact welding during faults, MCB knob does not show OFF position. This is essential to prevent any serious accidents during maintenance.
- **Energy Limitation Class-3** : to ensure minimum let through energy in the event of a fault, for safety of downstream circuit equipment. (to be mentioned on the MCB as per standards)
- **Low Power Loss** : MCBs should have low power loss, in any case not more than prescribed limits of standards. Energy efficient MCBs having lesser power loss than prescribed in relevant standards will be preferred.
- **Line-Load Reversibility** : to allow line or load connections from top or bottom terminals without any risk of unsafe operation or protection performance of MCB.
- **Ease of Installation**: MCBs should have design to help easy & fast installation on DIN rail, with provision of dual position bistable clips for secured mounting.
- **Large Terminal Design** : MCBs to have minimum 25 sq.mm. terminals for ratings below 32A, and 35 sq.mm. for ratings of 32A and above, to ensure perfect termination of connections. Terminals of MCBs shall have captive screws.
- **Ease of Identification** : Basic technical parameters, rating, operating voltage, etc. shall be printed on front face of MCB for ease of identification.

- Mechanical Life shall be 20000 operations and Service life at rated load for In below 32A shall be 20000 and for In above 32A shall be 10000 operations.

B. Earth Leakage Circuit Breaker / Residual Current Circuit Breaker - Current Operated Type (ELCB / RCCB / RCBO)

Residual Current Circuit Breakers shall conform to IEC 61008.& IS12640.
ISI marking is compulsory on RCCB.
The RCCBs shall have sensitivities of 30 mA, 100mA, 300 mA as per the requirement / as per BOQ. For People Protection the sensitivity must not be more than 30mA.

A 100/300mA RCCB is recommended for Protection against fire

The RCCBs shall have disconnection facility with suitability for Isolation and Positive Contact Indication, and shall be immune towards nuisance tripping due to Transient overvoltages.

The RCCBs shall have trip indication facility on the front face.

- **System of operation**

ELCB/ RCCB/RCBO shall work on the principle of core balance transformer. The incoming shall pass through torroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be generated in the secondary winding of the transformer. In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a pre-determined critical value. ELCB/RCCB/RCBO shall be current operated independent of line voltage. Current sensitivity shall be of 30mA at 240/415V AC or as specified in BOQ / drawings and shall have a minimum of 10000 electrical operations. The RCBO shall also provide over load and short circuit protection in addition to the earth leakage protection.

- **Mechanical Operation**

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing/opening of all three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under tripping conditions.

- **Neutral Advance Feature**

The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact. First before the phases; and at the time of opening, the neutral shall break last after allowing the phases to open first. This is an important safety feature which is also required by regulations.

- **Testing Provision**

A test device shall be incorporated to check the integrity of earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB/RCCB/RCBO and the operating handle shall move to the “OFF” position.

C. MOULDED CASE CIRCUIT BREAKER (MCCB's)

The rated normal current should be specified at 40°C

The present specification applies to moulded-case circuit breakers (MCCB) from 16A to 800 Amp for AC (50/60Hz) low voltage electrical installation from 220V to 415V. MCCB shall be equipped with a trip Unit that offers the appropriate level of performance to fit to the application.

MCCBs shall be designed for both vertical and horizontal mounting, without any adverse effect on Electrical performance. It shall be possible to supply power either from the upstream or downstream side.

For a MCCB rating frame given, MCCBs dimensions shall be the same whatever the ultimate breaking capacity.

MCCB shall have a rated operational voltage of 415 V and insulation voltage of 600 V (AC 50/60 Hz),

The breaking capacity performance certificates shall be available for category A to the above mentioned standards. The MCCBs shall have a rated service breaking capacity (Ics) equal to the ultimate breaking capacity (Icu) at defined operational voltage.

The moulded case circuit breaker shall have a breaking capacity as mentioned against each in Schedule of Quantity at 415 volts. Wherever required, higher breaking capacity breakers to meet the system short circuit fault shall be used. In absence of any capacity specifically mentioned in the bill of quantities and drawings, following breaking capacities shall be used –

100 / 125 Amp : 25 KA

160/200/250/300 Amp : 35 KA

400/630/800 Amp : 50 KA

Compliance with Standards

Standard	Title	Usage
IS /IEC 60947-1 & 2	Low-voltage Switchgear and control gear	Characteristics of circuit-breakers;
	Part 2 : Circuit Breaker	- operation and behavior in normal service;
		- Operation and behavior in case of overload and operation and behavior in case of short-circuit.
		- Dielectric properties

Circuit breaker design

Safety

For maximum safety, the power contacts shall be insulated in an enclosure made of a thermosetting material from other functions such as the operating mechanism, the case, the trip unit and auxiliaries (ON/OFF/Trip Contact, Shun t, Under Voltage etc.)

All poles shall operate simultaneously for circuit breaker opening, closing and tripping.

Isolation

In order to ensure suitability for isolation complying with IEC 60947-2 § 7-27:

MCCBs shall be actuated by a toggle or handle that clearly indicates the three positions: ON, OFF and TRIPPED.

MCCB should clearly indicate the suitability for isolation in the name plate identified by the symbol.

The operating mechanism shall be designed such that the toggle or handle can only be in OFF position (O) if the power contacts are all actually separated, in OFF position, the toggle or handle shall indicate the isolation position.

MCCBs shall be able to receive a device for locking in the “isolated” position, with up to 3 padlocks, Ø8 maximum.

MCCBs shall be equipped with a “push to trip” button in front to test operation and the opening of the poles.

MCCB rating, “push to trip” button, performances and contact position indication must be clearly visible and accessible from the front, through the front panel or the door of the switchboard.

Class II Front Face

MCCBs shall be designed to prevent access to live parts when the cover is removed , means main current path of the circuit breaker should be isolated from auxiliary section i.e MCCB shall offer class –II front face.

Current Limitation, Durability

From 16 A to 800 A rating frame, MCCBs shall equip a double breaking type rotary contact Mechanism, having current- limiting feature to limit let through energy on the installation.

The electrical durability of MCCBs, as defined by IEC 60947-2 standard, shall be at least equal to 3 times the minimum required by the standard (8000 operations up to 250A & 4000 operations up to 800A).

Auxiliaries and accessories

MCCBs shall be designed to enable safe on-site installation of auxiliaries such as voltage releases (shunt & under voltage releases) and indication switches as follows:

- Field installable auxiliary contacts for signalizing different functions, as: open/ closed position, fault signal, electrical fault (including earth fault) signal, all auxiliaries shall be common for the entire range,
- They shall be separated from power circuits,
- All electrical auxiliaries shall be of the snap-in type and fitted with terminal blocks,
- Auxiliary function and terminals shall be permanently engraved on the case of the circuit breaker and the auxiliary itself.
- The addition of auxiliaries shall not increase the volume of the circuit breaker.
- Rotary handle, shall not mask or block device settings, and should indicate three positions O (OFF),I (ON)and tripped.
- Rotary handle should have push to trip button.
- Rotary handle should have provision to install lock and key arrangement for interlocking purpose (Example: 2 lock 1 key ,3 lock two key etc.)
- Rotary handle shall ensure IP40 for direct type and IP 55 for extended Rotary handle.

Protections requirements

General

- MCCBs shall comprise a device, designed to trip the circuit-breaker in the event of high-value short-circuit currents. This device shall be independent of the thermal magnetic or electronic trip unit.
- MCCBs up to 250A shall be equipped with Thermal magnetic trip unit.
- MCCBs with ratings over 250A shall be equipped with electronic trip units.

Thermo-magnetic trip unit should have:

- Adjustable thermal protection from 75 – 100% times the current rating
- Protection setting shall apply to all circuit breakers pole thru single knob from the front of MCCB without opening the front cover of the MCCB.
- Fixed magnetic protection for current ratings up to 250 A.

Electronic trip units should have:

- Adjustable over load protection from 50 -100% times the current rating
- Variable short circuit protection from 2 to 10 Ir.
- Protection setting shall apply to all circuit breakers pole thru single knob from the front of MCCB without opening the front cover of the MCCB
- In case of 4 pole MCCB neutral should be adjustable as a Neutral unprotected or Neutral Protection.

Earth protection

Earth Fault protection, Where ever specified, MCCB should have Earth fault protection as provision. MCCB earth fault protection should have following settings.

- Selection of Ir MCCB rating.
- Earth fault sensitivity selection from 10 – 60% In
- Time delay selection in case of Earth Fault with instantaneous feature.

Installation

It should be possible to terminate Aluminium cable of required size for the defined current carrying capacity. The requisite size should be made available by means of extended terminals (as a standard offer) in case the direct terminals are not of adequate size. Adequate phase to phase clearance has to be ensured in case of extended terminations.

The circuit breaker should provide the flexibility of terminating line and load from any direction. Manufacturers should test the circuit breaker for this condition and requisite test certificate should be available.

Phase barrier should be provided as a standard feature.

Testing

a) Original test certificate of the MCCB as per IEC/IS 60947 - 2 shall be furnished.

b) Pre-commissioning tests on the switchboard panel incorporating the MCCB shall be done as per standard specifications.

D. AIR CIRCUIT BREAKER (ACB'S)

General:

- Circuit breakers shall be of 3pole or 4pole, air break, moulded case, horizontal draw-out type fully interlocked or fixed type as specified and designed to deliver performances without periodical maintenance.
- Air circuit breakers (ACB) shall comply with standards IS/IEC 60947-1 & 2. The breakers shall be tested & certified at CPRI/ERDA.
- Air circuit breakers shall have a rated operational voltage of 600 V AC (50/60Hz).
- The rated insulation voltage should be atleast 1000V AC (50/60Hz) & impulse voltage of 12 kV.
- Circuit breakers shall be capable of carrying the full load current defined for 50^{o} C without any derating.
- Circuit breaker main contacts shall be silver plated high grade copper with each pole encased in a reinforced polyester casing completely insulated from each other internally and offer double insulation for the operators on the breaker front face.
- Circuit breakers shall be of single frame having uniform "height x width x depth" with common door cut-outs.

Performances:

- The ACB breaking capacity performance certificates shall be available for category B according to IEC 60947-2 standard.
- The tests shall be carried out with a breaking performance during operation (Ics) and admissible short time withstand (Icw) equal to the ultimate breaking capacity (Icu). i.e. Icu = Ics = Icw = 50KA for 1 Sec. or as specified in BOQ.
- All Air circuit breakers can be reverse fed without reduction in performance.
- The Circuit Breaker shall have higher Mechanical life i.e. 20000 operations up to 1600A & 16000 operations for ratings >1600A.
- The breakers shall have high electrical life i.e. 5000 operations up to 1600A & 5000 operations for ratings 1600A without maintenance
- The operating mechanism shall be of the Open/Closed/Open stored-energy spring type. The closing time shall be less than or equal to 70 milliseconds to ensure faster closing.
- The operating mechanism shall be of fast opening type with opening time of breaker should be <40ms & spring charging time of less than 5 seconds.
- All 4 Pole ACBs shall have fully rated neutral equal to rating of the breaker & shall be protected against over-load & short-circuit with provisions for settings at neutral for protection, half protection or no protection.

Accessories & Auxiliaries:

- Electrical operated Circuit Breakers shall be operated with remote operation function combined with spring charging motor, closing coil & shunt trip coil having control voltage of 240 VAC. The electrical operated breaker shall also be provided with operating handle for manual closing, mechanical ON/OFF indicator, spring charged indicator, etc.,

- Shunt trip and closing coil shall be of typical design and both should be accessible from the front of ACB after opening the cover, without disturbing any other part/release.

- Circuit breaker shall be provided with under-voltage trip release which shall automatically trip the breaker for voltages in the range of 35% to 70% of the system voltage.

- The ACB design shall be modular in construction that is it shall be possible to mount the coils from the front without removing the breaker from Cradle.

- All electrical auxiliaries including the motor spring charging mechanism shall be field adaptable and should not require any calibration at site or the necessity for any tool (except a screwdriver).

- The Circuit Breaker shall have minimum 6 changeover auxiliary contacts rated at 10 A 240/380V volts 50 Hz. There should exist facility to add one more set of 4 contacts as required.

- Option for fixing Ready-to-close contact shall exist for indicating that all safety parameters are checked & enabling closure of breaker, ensuring at-most safety for the user.

- All accessories & auxiliaries should be common for entire range of circuit breakers.

Safety:

- It shall be possible to connect all auxiliary wiring from the front face of the air circuit breaker. This wiring shall be taken through a set of disconnecting contacts, so that all auxiliary wiring is automatically disconnected in the isolated position.

- There exists clear indication of the following parameters in the front panel of the circuit breakers:

  - ☐ ON - Circuit breaker closed
  - ☐ OFF - Circuit breaker open
  - ☐ Spring Charged – Ready-to-close
  - ☐ Spring charged – Not ready-to-close
  - ☐ Spring discharged
  - ☐ circuit breaker in "service" position (drawout only)
  - ☐ circuit breaker in "test" position (drawout only)
  - ☐ circuit breaker in "isolated" position (drawout only)

- Mechanical and electrical anti-pumping devices shall be incorporated in the circuit breakers as required.
- The circuit breaker shall be fitted with arc chutes on each pole designed to permit rapid dispersion, cooling and extinction of the arc. Arc Chute cover should be integral part of breaker to safeguard persons from arc during extinction & it shall be removable on site.
- The automatic shutters should be integral part of breaker & locking arrangement should be provided as per standards.

- The with-drawable circuit breaker shall have the following three distinct and separate positions, which shall be indicated on the face of the panel.

  - ☐ "Service" -- Both main and auxiliary circuits are connected
  - ☐ "Test" – All auxiliary circuits are connected & main circuits are disconnected
  - ☐ "Isolated" -- Both main and auxiliary circuits are disconnected

- The circuit breaker shall be suitable for moving out to Maintenance Position with the telescopic rails extended and with the cubicle door opened. The routine maintenance shall be capable of being carried out in this position.
- There should be a positive locking at these positions while racking out or racking in for clear & confirmative indications as the position is reached. A push button shall be available to release the lock.

Interlocks:

- It shall not be possible to with-draw the breaker from the cubicle in "ON" condition. To achieve this, suitable mechanism shall be provided to trip the breaker before the Breaker is isolated.
- It shall not be possible to switch “ON” the breaker until it is either in the fully inserted position or for testing purposes it is in the fully isolated position.
- It shall not be possible for the Circuit Breaker to be plugged in unless it is in the OFF position.
- A safety catch shall be provided to ensure that the movement of the breaker, as it is withdrawn, is checked before it is completely out of the cubicle, thus preventing its accidental fall due to its weight.
- A door interlock shall be provided so that it shall not be possible to open the door until the air circuit breaker moving part is in the disconnected position.
- A mis-match interlocking shall be provided to prevent insertion of a draw-out type circuit breaker having a rating higher than the current rating of the fixed part.
- The racking handle shall be stored on the air circuit breaker in such a manner as to be accessible without defeating the door interlocking.
- Provision should exist for fixing key lock to have secured interlocking with the other circuit breakers.
- The breaker shall be locked in disconnected position using key lock or padlock to avoid accidental charging of the breaker during maintenance phase.

Terminations:

- All circuit breakers shall be fully tropicalized as standard & suitable for terminating copper or aluminium bus bars.
- Both fixed & draw-out circuit breakers shall have single pole-pitch to ensure sufficient & safer clearances between phases.
- Provision shall exist to change the orientation of rear terminations from to horizontal to vertical connection or vice-versa at installation to enable ease of bus bar/cable terminations.

Protections:

- The Circuit breaker protection shall be through micro processor based trip units.
- The micro processor release should be self powered type without any auxiliary power supply during normal operation of the breaker.
- The circuit breaker control unit shall measure the true r.m.s value of the current.
- The protection release shall have following protections as standard.

- ☐ Adjustable over load current (Ir) settings from 40% to 100% of rating of ACB (In).
- ☐ Over load time setting (tr) from 0.5s, 1s, 2s, 4s…….24s as field selectable curves
- ☐ Short circuit setting (Isd) from 1.5 to 10 times of Ir setting
- ☐ Short circuit time delay adjustable from 0 to 400 msec.
- ☐ Instantaneous (Ii) protection with an adjustable pick-up and an OFF position.
- ☐ Earth fault setting adjustable in absolute Ampere with time delay settings from 0 to 400 ms.

- I^2t ON / I^2t OFF options shall be available for short-circuit & earth fault protections to enhance discrimination with downstream devices.
- Individual fault trip LED indications shall be available on the trip unit for easy & faster identifying the cause of fault.
- The trip unit shall have integral test facility to verify the healthiness and to avoid external calibration.
- The release shall be self diagnostic with separate indication in case of mal functioning.
- It shall be possible to change the protection settings on line and the circuit breaker need not be switched of while adjusting the setting.
- Circuit breakers shall conform to Electromagnetic compatibility tests (EMC) as specified in IEC60947-2.
- The Circuit breaker control unit shall be interchangeable on site for adaptation to changes in the installation.
- The control unit shall have thermal memory throughout the range to store temperature rise data in case of repetitive overload or earth fault for protecting the cables and loads.
- Circuit breakers in the outgoing feeders shall be provided with micro processor / Thermo magnetic based trip units (as per BOQ) offering protection against over load (Long time) & Instantaneous protection ensuring total discrimination.

Testing

Testing of each circuit breaker shall be carried out at the works as per IEC:60947 and the original test certificate shall be furnished in triplicate. The tests shall incorporate atleast the following:

i) Impulse withstand test

ii) Insulation test

iii) Di-electric rigidity /Insulation test

iv) Mechanical operation checking

v) Thermal protection with a current of 3ith starting from cold conditions.

CAPACITORS

Power factor correction capacitors shall conform in all respects to IS 2834-1964, IS : 13340, 13341 & IEC 831 – 1&2. The shunt capacitors shall be suitable for 3 phase 440V at 50Hz. frequency and shall be available in units as per B.O.Q. to form a bank of capacitors of desired capacity. All these units shall be connected in parallel by means of high conductivity aluminium busbars of adequate current carrying capacity having S.C rating as specified in BOQ & SLD for 1 sec. Each capacitor bank terminal shall be suitable for connecting aluminium conductor cable/solid bus connections. Two separate earthing terminals shall be provided for each bank for earth connection.

The capacitor bank shall be subject to routine & type tests as specified in relevant Indian Standard and the bidder will submitt testing procedure for capacities at factory & site. The capacitor shall be suitable for indoor/outdoor use upto 45 Deg.C over and above ambient temperature of 50 degree C. The permissible overloads shall be as given below:

a) Voltage overload shall be 10% for continuous operation and 20% for every 6 hours in a 24 hours cycle.

b) Current overload 15% for continuous operation and 50% for every 6 hours in a 24 hours cycle.

The capacitor banks shall be floor bracket mounting type indoor housing using minimum floor space.

Capacitors shall be of aluminium foil and craft paper (heavy duty self healing type). Hermetrically sealed in sturdy corrosion-proof sheet steel 2mm thick containers and impregnated with non-inflammable synthetic liquid and of low power loss version. Every element of each capacitor unit shall be provided with its own built in in-rush current inductor with discharge resistor and silvered fuse against short circuit % / over load protection. The capacitor shall have suitable discharge device to reduce the residual voltage from crest value of the rated voltage to 50 V or less within one minute after capacitor is disconnected from the source of supply. The loss factor of capacitor shall not exceed 0.005 for capacitors with synthetic impregnants. The capacitors shall withstand voltage of 2500V AC supply for 1 minute.

The insulation resistance between capacitor terminals and containers when test voltage of 500V A.C. is applied shall not be less than 50 megohms.

- Capacitors shall be rated for 650 V AC 50 Hz.
- Capacitor bank and switching equipments shall be housed in seprate cubicle compartment having degree of protection IP-42 and constructed with sheet steel of minimum 2mm thickness.
- Each capacitor shall be provided with built-in/externally provided inductor coil to limit inrush current within safe limit.

Filter:-

- Testing shall be done as per applicable standards for shunt capacitors.
- Insulation test etc.

- For harmonic suppression inductive reactor with taping shall be provided along with capacitor. These shall be switch on or off incase of 3rd Harmonic distortion is increasing more than 3%.

CAPACITOR CONTROL PANEL

The capacitor control panel shall general comprise of the following:

a) Automatic power factor correction relay microprocessor based for 4 quadrant operation with built-in step controller (for forward & backward) and shall perform the function as well display on screen:

Target Cos phi	:	Cos phi, KVAR missing.
Transformer ratio	:	Electric supply parameter.
Switching settings	:	Temperature.
Harmonic cut off	:	Harmonics
Start power	:	Stages
		Other information.

Programming (inter – select and menu).

b) Relay should have inbuilt facility to check phase sequence when every time switched on and adjust the phase sequence automatically to get the proper PF.

c) The relay shall decide the no. of capacitor banks to switched on or off according to the set power factor requirements.

d) Protection MCCB with static O/C and S/C.

e) Capacitor duty contactor for individual capacitors with MCCB control.

f) Change over switch for either automatic operation or manual operation with push button control.

g) C.T.s with ammeter and selector switch.

h) Voltmeter with selector switch.

i) Indicating lights RYB.

j) In the manual mode also timer to be incorporated to allow discharge time of capacitors.

All the capacitors and contactors shall be interconnected with PVC insulated copper conductor wires of adequate size in a neat and acceptable manner. Three phases and neutral bus bar (copper) shall be provided in panel as required.

The above control gear, P.F. meter, Digital Microprocessor based P.F. correction relay, push button station etc. shall be housed in a sheet steel metal enclosure cubical type, free standing front operated with lockable doors. The panel shall be fabricated from MS sheet steel 2mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet steel shall be seam-welded. The panel shall be totally enclosed design completely dust tight and vermin proof. Gaskets between all adjacent units and beneath all covers shall be used to render the joints effectively.

Ventilation fan with a thermostat any toggle switch shall be provided inside panel to maintain internal temperature mentioned else where.

All sheet steel material used in the construction of capacitor control panel should have undergone a rigorous rust proofing process comprising Alkaline Degreasing, descaling in dilute sulphuric acid

and recognised phosphating process. The steel work should then receive two coats of primer before applying final coat of epoxy paint of approved shade.

Tests :-

Type and routine tests at factory as per relevant IS the bidder will submit testing procedure for.

Quality Assurance (Q.A.)

Quality Assurance shall follow the requirement of Client/ Consultant. Q.A. documents as applicable.

Q.A. involvement will commence at enquiry and follow through to composition and acceptable thus ensuring total conformity to purchaser's requirement.

Deviations

Deviations from the specification must be stated in writing at the quotation stage.

In the absence of such a statement it will be assumed that the requirements of the specifications are met without exception.

LIST OF APPROVED MANUFACTURERS FOR ELECTRICAL WORKS

S.No.	DESCRIPTION	MANUFACTURER'S NAME
1	MCB / RCCB / RCBO / DB	Legrand / Schneider / Hager / L&T / ABB / Indo Asian
2	Industrial outlet	Legrand / Schneider / Hager / L&T / ABB / Indo Asian
3	MCCB (Microprocessor)	ABB (Tmax) / L & T (D sine) / Schnieder (Compact NXS / NS) / Siemens (3VL) / Legrand (DPX) / Mitsubishi NF
4	MCCB (Thermo-Magnetic)	ABB (Tmax) / L & T (D sine) / Schnieder (Easypact CVS / Compact) / Siemens (3VT / 3VL) / Legrand (DPX) / Mitsubishi NF
5	MPCB (Microprocessor)	ABB / L & T / Schnieder / Siemens / Legrand
6	AIR CIRCUIT BREAKER	ABB (E max) / L & T (U power Omega) / Schneider (Masterpact MVS / NW) / Siemens (3WL) / Legrand (DMX^3) / Mitsubishi AESW
7	SWITCH FUSE UNIT WITH HRC FUSES	L & T / Siemens / ABB / Schneider
8	CONTACTORS / RELAYS	L & T / Siemens / ABB / Schneider
9	CT / PT	Kappa / AE / ECS / Kalpa
10	Ammeters / Voltmeters and metering equipmer	L & T / Siemens / Automatic Electric / Neptune / enercon / Secure / Rishabh
11	Selector Switches	Kaycee / Salzar / L&T
12	LED Lamps	L&T / Vaishno / Siemens
13	Change Over Switches	GE / L&T / HH Elcon / ABB
14	PVC insulated Copper conductor wires	Finolex / RR / Polycab / Skytone
15	Cat 5 / Cat 6 Cables	AMP / Systemax / Lucent / Legrand
16	PVC / XLPE INSULATED 33 KV CABLES	Finolex / Polycab / Skytone
17	PVC / XLPE INSULATED 1.1 KV CABLES	Finolex / Polycab / Skytone / RR
18	CONTROL CABLES / WIRES	Finolex / Polycab / Skytone / RR
19	L.T. Fire Survival Cable	Polycab / RR / Frtek
20	H.V. CABLE TERMINAL JOINTS	RAYCHEM / 3 M / M-seal
21	LUGS	DOWELLS / 3D / 3 M / Comet / Hex

LIST OF APPROVED MANUFACTURERS FOR ELECTRICAL WORKS

S.No.	DESCRIPTION	MANUFACTURER'S NAME
22	CABLE GLANDS	SIEMENS / COMET / GRIPPWEL
23	CABLE TRAY	Indiana / Bharti / Slotco / Steelways / Profab / Rico / MEM / Dynamic / RST / Vidhyut Control / True Leader
24	Energy Analyser (with RS 485 port)	Enercon / L & T / CONZERV
25	UPS	Emerson / APC
26	Main L T PANEL, Sub Panels & Bus Duct / Rising mains Fabricators	Tricolite / Ambit / Adlec / Advance (Delhi) / RST / Vidhyut Control / Neptune / Dynamic.
27	PLC	ALLEN BRADLEY / SIEMENS / MITSUBISHI / ABB
28	SPD'S	Schneider / DEHN / Furse
29	Aluminium Bus Bars	Electrolytic grade - Hindalco / Jindal
30	Copper Bus Bars	Electrolytic grade - Rachna Metal / Libu Metal
31	Capacitor	DUCATI / Epcos / ABB / L&T / Schneider
32	CT / PT	L&T/ Kappa / AE / ECS / Kalpa
33	APFC relay	L &T / DUCATI / Seimens/ Epcos / ABB / Schneider
34	Isolator and D O Fuses	AMEI / ELPRO / STERLING
35	BATTERY CHARGING PANEL	KELTRON / NELCO / VOLT STAT
36	BATTERIES	EXIDE / AMCO / STANDARD / Prestolite
37	Earthing / Lightning Protection	Erico / Furse / DHEN / OBO / CAPE
38	Fire Sealant	Birla 3M / HILTI / Nu Green
39	Any Other Items	On approval of consultant or Engg in charge

NOTE :

1	The choice of the Final makes shall be made by the owner / consultant.
2	The samples or Cat. No. of all type of switches & light fittings should be approved before execution.

	SCHEDULE OF QUANTITIES FOR ELECTRICAL INSTALLATIONS				
	PROJECT : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA. (FOR TOWER A, B, C, 1 & 2 ONLY)				
	PART (C) - SUPPLY OF PANELS				
	IMPORTANT NOTE - COMPLETE ELECTRICAL SCHEME TO BE APPROVED FROM UPPCL DEPARTMENT, BEFORE START ANY DESIGNING / FABRICATION.				
S.No	**DESCRIPTION**	**QTY**	**UNIT**	**RATE**	**AMOUNT**
1	**MAIN COMMON SERVICES LT PANEL**				
	Design, manufacture, supply inspection, handling, assembling, affecting proper connections, testing and commissioning of 14 SWG CRCA sheet steel fabricated cubical type **Main Common Services LT Panel ,** floor mounting, dust & vermin proof, front operated construction, enclosure class - IP 52, powder coated after proper treatment with 9 tank process with top/bottom removable gland plates, as required, double compression type cable glands, earth bus, hinged and lockable doors to achieve dust and vermin proof complete with all inter connections small wiring by min. 2.5 sq. mm. FRLS copper wires, ckt labels etc. The Aluminium Bus Bar shall be of suitable length, 500 volts, 3 phase 50 Hz TPN, electrolytic aluminium as per IS 8623 . The panel feeders shall be suitable for terminating suitable nos. 3.5 / 4 core armoured aluminium cable or Aluminium Bus Duct as required.				
	All Incoming / bus coupler / Outgoings ACB's shall have inbuilt microprocesor based Over load protection (L), Short Circuit protection (S), Instantaneous Short Circuit protection (I), Earth Fault protection (G), Shunt Trip releases. All ACB should have Ics=Icu=Icw=50 KA for 1 sec, fully rated at 50 deg C ambient temperature & shall be supplied with adopter terminal connection whose orientation can be changed at site. All ACB shall be supplied with all standard accessories i.e. auxillary switch with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:60947				
	All incoming & outgoing MCCB's shall be microprocessor based with O/L & S/C and E/F protection.				
	All MCCB's shall be Ics = 100% Icu, with rotary handle & pad locking arrangement, with adjustable O/L & S/C trip setting as per load requirement. All TP MCCB shall be with heavy duty solid isolable neutral link.				
	The breaking capacity specified for all ACB's and MCCB's breakers is Ics value (service rating).				
	The instrument chamber shall be separate and shall comprise of flush type ammeter, voltmeter, selector switches, cast resin type CT's & PT's, etc. Separate CT's shall be provided for protective and measuring system and for APFCR of capacitor bank with suitable VA.				
	Mix & Match families / makes of ACB's / MCCB's shall not be allowed, They are all of same manufacturer.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	Each section of Panel shall have door opearted light of sufficent lux to illumunate that section & each section of capacitor, buscoupler, transformer and DG incomers shall have exhaust fans for ventilation purpose.				
	All Energy Analyser / TVM Shall have RS 485 Modbus RTU on board Communication protocol for SCADA communication.				
	The fault withstanding capacity of panel & its control gear shall be min. 35 KA rms for 1 sec.				
	Note - Panel shall have self powered with inbuilt UPS and required battery sets.				
	The Panel shall have a provision for AUTOMATIC FIRE DETECTION GAS SUPPRESSION flooding system for complete panel of each compartment / section including gas bank of required capacity (Note - Gas Suppression flooding sysytem having seperate item).				
	GA drawings shall be got approved from Owners / Architects / Consultants before fabrication.The panel has to be specifically fabricated as per the space available at basement level. The existing column positions will also be considered.				
	ACB Make and model :- ABB E-max, L&T-U Power Omega, Schneider - Master Pact - NW / MVS, Siemens - 3WL, Mitsubishi AESW (DP-1), Legrand-DMX^3				
	MCCB Make and model :- ABB - T-max, L&T - D sine, Schneider - Compact NS / NSX / CVS, Siemens - 3VL, Legrand-DPX, Mitsubishi NF.				
	INCOMERS from 1 Nos. 1600 KVA Transformer				
	1 nos. 2500 AMP. Four Pole, Electrically operated 3 position motorized (220 V AC) drawout type **Air Circuit Breaker** with all inbuilt protections, with microprocessor based release, over current, earth fault, short circuit, Instantaneous short circuit, closing coil (220 V AC), trip coil (24 V DC), shunt trip release, inbuilt U/V release with LCD / LED display for event history with intruppted current value during fault & measurement of current parameters, **50 KA** Breaking Capaciy with all standard accessories i.e. auxillary switch with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:60947				
	ACB and Release Make / model :- ABB E-max (PR122), L&T-U Power Omega (MTX 2.5G), Schneider - Master Pact - NW / MVS (Micrologic 6.0A), Siemens - 3WL (ETU45B), Legrand - DMX^3 (MP4-LSIG), Mitsubishi AESW (DP-1).				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	The ACB shall be electrically interlocked with the other incomer from Main LT Panel.				
	1 nos. 50 KVAR capacitor bank with 125 amp TP MCCB (35 KA) for transformer incomer.				
	For Fire Fighting Standby Supply - 1 no. 800 AMP. Three Pole, manually operated 3 position drawout type **Air Circuit Breaker** with heavy duty solid neutral link, with all builtin protections, with microprocessor based over current, earth fault, short circuit, Instantaneous short circuit, shunt trip release, closing coil (220V AC), trip coil (24V DC), 50 KA Breaking Capacity with all standard accessories i.e. auxillary switch with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:60947 (without Under Voltage protection).				
	Protection releases / relays, Metering & Accessories for each Transformer incomers				
	Surge Protection Device - Type - 01 (Class - B), 10/350 µ sec. (100 / 25KA) wirh HRC fuses for protection.				
	Over Voltage / Under Voltage relay / release (3 phase) with timer.				
	Backup earth fault relay.				
	Restricted earth fault relay.				
	There shall be a provision in REF protection that if they (REF) operates, they send a signal to Upstream HT breaker of Transformer incomer in HT Panel to make it "OFF" for protection of transformer.				
	Master trip relay.				
	Trip Circuit Supervison relay.				
	TNC switch.				
	Auto manual selector switch.				
	1 nos. 0-500 volt range digital type voltmeter with selector switch				
	1 set of 3 CT's of ratio 2500/5A, Class 1.0 accuracy 15 VA burden for metering.				
	1 set of 3 CT's of ratio 2500/5A, Class 1.0 accuracy 15 VA burden for APFCR.				
	1 set - 415 / √3 / 110 / √3 Class 1.0 accuracy 100 VA burden PT along with primary and secondary fuse.				
	1 set of 4 CT's of ratio 2500/1A, Class PS for protection.				
	1 no. CT's of ratio 2500/5A, Class 5P20 for protection.				
	1 no. 0-2500 Amp range digital type ammeter with selector switch.				
	Energy analyser (digital type) consisting of I, V, KW, KWH, KVA, PF, HZ, MDI (EM 6400 of Conzerve or equi.) with RS 485 communication port for communication / report generation.				
	Power factor meter.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	Frequency meter.				
	3 Nos. LED type phase indicating lamps, each lamp shall be with bakup MCB along with hooter, auxillary relay, 2 sets of push buttons.				
	6 Nos. LED type indicating lamp for indicating the status of feeder - ON / OFF / TRIP / Trip circuit healthy / DC supply healthy / Spring charged. Each lamp shall be with bakup MCB.				
	INCOMERS from Main LT Panel				
	1 nos. 1600 AMP. Four Pole, Electrically operated 3 position motorized (220 V AC) drawout type **Air Circuit Breaker** with all inbuilt protections, with microprocessor based release, over current, earth fault, short circuit, Instantaneous short circuit, closing coil (220 V AC), trip coil (24 V DC), shunt trip release, inbuilt U/V release with LCD / LED display for event history with intruppted current value during fault & measurement of current parameters, **50 KA** Breaking Capaciy with all standard accessories i.e. auxillary switch with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:60947				
	The ACB shall be electrically & mechanically interlocked with the transformer incomers.				
	Protection releases / relays, Metering & Accessories for each Transformer incomers				
	Master trip relay.				
	Trip Circuit Supervison relay.				
	TNC switch.				
	Auto manual selector switch.				
	1 nos. 0-500 volt range digital type voltmeter with selector switch				
	1 set of 3 CT's of ratio 1600/5A, Class 1.0 accuracy 15 VA burden for metering.				
	1 set - 415 / √3 / 110 / √3 Class 1.0 accuracy 100 VA burden PT along with primary and secondary fuse.				
	1 no. 0-1600 Amp range digital type ammeter with selector switch.				
	3 Nos. LED type phase indicating lamps, each lamp shall be with bakup MCB along with hooter, auxillary relay, 2 sets of push buttons.				
	6 Nos. LED type indicating lamp for indicating the status of feeder - ON / OFF / TRIP / Trip circuit healthy / DC supply healthy / Spring Charged. Each lamp shall be with bakup MCB.				
	INCOMERS from Solar PV Panel				
	1 nos. 100 AMP. FP MCCB 35 KA, microprocessor based with KWHR meter + **1 nos FP 100 AMP (35KA) Contactor** along all accessories. (Contactor shall be interlocked in such a way, at power Failure the Position of Contactor become OFF & after Power resume the position of Contactor become ON)				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	BUS BARS				
	Bus Bar Make :- HINDALCO / JINDAL.				
	1 sections of 2500 AMP ,415 Volts, 3 phase 50 HZ TPN high conductivity electrolytic Aluminium bus bar with conductivity on min 57 to 58% of suitable length, SMC / DMC supports, with colour coading and insulated by heat shrinkable sleeves and clip on shrouds for joints.				
	The current density of main bus bar & drooper bus bar up to 1000 Amp shall be minimum 1.00 sq mm / amp & for 1250 / 1600 amp shall be minimum 1.30 sq.mm / amp & for 2000 / 2500 amp shall be minimum 1.60 sq.mm / amp .				
	The Maximum allowable temperature for the Bus bar to be restricted to 85 deg C. The temperature rise should be restricted to 35 deg C above design ambient temperature of 50 deg C.				
	Bus PT Module 1 Nos.,(for bus section) each with Following:				
	3PH. 415/v3/110/v3 V 100VA with Fuses.				
	R,Y,B Ind. Light with Control Fuses				
	Voltage Relay				
	(Note - All the indication & metering shall be done through 110V from secondary of PT's. No indication lamps & metering should not be operated at 415 Volts.)				
	PLC for load management / automation				
	SAME PLC WILL BE USED AS IN MAIN LT PANEL, BOTH THE INCOMER SHALL BE OPERATED WITH SAME PLC OF MAIN LT PANEL, REFER SUBMITTED SLD.				
	CHANGE OVER SWITCH				
	1 Nos. 800 A four pole **(35kA)** On Load Change Over switch for Fire Pump feeder.				
	OUTGOINGS -				
	All outgoing feeders shall be provided with one set of phase indication lamps and trip indication lamps with protection fuses/MCB and ammeter with selector switch with suitable ratio CT's of accuracy class 1.0				
	All outgoing feeders shall be provided with electronic dual reading KWHR meter with RS 485 communication port except capacitor feeder, CT's with accuracy class 1, control circuits and wiring as per SLD.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	ACB and Release Make / model :- ABB E-max (PR121), L&T-U Power Omega (MTX 1.0G), Schneider - Master Pact - NW / MVS (Micrologic 6.0G), Siemens - 3WL (ETU45B), Legrand - DMX^3 (MP4-LSIG), Mitsubishi AESW (DP-1).				
	MCCB Make and model :- ABB - T-max, L&T - D sine, Schneider - Compact NS / NSX / CVS, Siemens - 3VL, Legrand- DPX, , Mitsubishi NF				
	1 no. 1000 AMP. Four Pole, Electrically operated 3 position motorized drawout type **Air Circuit Breaker** , with all inbuilt protections, with microprocessor based releases/relays, over current, earth fault, short circuit, Instantaneous short circuit, shunt trip release, closing coil (220 V AC), trip coil (24 V DC), inbuilt U/V release with LCD / LED display for event history & measurement of current parameters with intruppted current value during fault , 50 KA Breaking Capaciy with all standard accessories i.e. auxillary switch with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:60947 . **(Note - ACB SHOULD BE INTERLOCKED WITH MAIN INCOMER OF TRANSFORMER IN SUCH A WAY, WHEN, MAINS "ON", THE BREAKER POSITION "ON" & if MAINS "OFF", THE BREAKER POSITION "OFF" TO ENERGIZED SUB COMMON SERVICES LT PANEL THROUGH GRID POWER ONLY).**				
	1 nos. 1000 AMP. Three Pole, manually operated 3 position drawout type **Air Circuit Breaker** with heavy duty solid neutral link, with all builtin protections, with microprocessor based over current, earth fault, short circuit, Instantaneous short circuit, shunt trip release, closing coil (220V AC), trip coil (24V DC), 50 KA Breaking Capacity with all standard accessories i.e. auxillary switch with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:60947 **(FOR CAPACITOR PANEL).**				
	2 nos. 800 AMP. Three Pole, manually operated 3 position drawout type **Air Circuit Breaker** with heavy duty solid neutral link, with all builtin protections, with microprocessor based over current, earth fault, short circuit, Instantaneous short circuit, shunt trip release, closing coil (220V AC), trip coil (24V DC), 50 KA Breaking Capacity with all standard accessories i.e. auxillary switch with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:60947				
	1 nos. 800 AMP. Three Pole, manually operated 3 position drawout type **Air Circuit Breaker** with heavy duty solid neutral link, with all builtin protections, with microprocessor based over current, earth fault, short circuit, Instantaneous short circuit, shunt trip release, closing coil (220V AC), trip coil (24V DC), 50 KA Breaking Capacity with all standard accessories i.e. auxillary switch with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:60947 **(without Under Voltage Protection - For Fire Fighting Feeder).**				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	1 nos. 320 AMPS TP MCCB. (35 KA)				
	5 nos. 200 AMPS TP MCCB. (35 KA)				
	6 nos. 160 AMPS TP MCCB. (35 KA)	1	Set		
2	**AUTOMATIC POWER FACTOR CORRECTION PANEL (For 2000 KVA Transformer)**				
	Design, manufacture, supply, inspection, handling, assembling, affecting proper connections, testing and commissioning of 14 SWG CRCA sheet steel fabricated cubical type **600 KVAR A P F C Panel** consisting of 5 / 10 / 15 / 20 / 25 / 50 KVAR (at 415 Volts rated voltage of bank shall be 440 Volts) capacitor units in tier formation, housed in an integrated cubicle type automatic switching ON and OFF control panel, floor mounting, dust & vermin proof, front operated construction, enclosure class - IP 52, powder coated after proper treatment with 9 tank process with top/bottom removable gland plates, as required, double compression type cable glands, earth bus, hinged and lockable doors to achieve dust and vermin proof complete with all inter connections small wiring by min. 2.5 sq. mm. copper wires, ckt labels etc. The Aluminium Bus Bar shall be of suitable length, 500 volts, 3 phase 50 Hz TPN, electrolytic aluminium as per IS 8623.				
	All MCCB's shall be Ics = 100% Icu, with rotary handle & pad locking arrangement, with adjustable O/L & S/C trip setting as per load requirement. All TP MCCB shall be with heavy duty solid isolable neutral link. The breaking capacity specified is Ics value. The instrument chamber shall be separate and shall comprise of flush type ammeter, voltmeter, selector switches, CT's, PT's, etc.				
	Mix & Match famlies / makes of ACB's / MCCB's / MCB's shall not be allowed, They are all of same manufacturer.				
	Capacitor duty contactors should be used for switching individual capacitor banks.				
	The fault withstanding capacity of panel & its control gear shall be min. 50 KA rms for 1 sec.				
	Each section of capacitor panel shall have Verticle hood & exhaust fans for ventilation purpose.				
	The maximum height of the panel should not exceed 2100 mm unless specifically approved.				
	INCOMING				
	Incoming breaker has been considered in the crossponding Main LT Panel.				
	1 set- 3 CTs , ratio 1200/5A Class 1.0 accuracy 15 VA burden for metering.				
	1Nos- (0-1200A) digital Ameter with selector switch				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	Micro processor based **automatic power factor control relay (3 phase)** (including power factor meter) in **16 steps** for automatic cut off or add on capacitor units to keep the power factor at 0.95 with variation of loads. All associated auxiliary contactors / relays shall be provided with in the scope of work.				
	Phase indicating lamps with HRC fuses, and indicating in each capacitor chamber unit to indicate On/Off status of capacitor unit.				
	BUS BARS				
	1250 AMP, 500 Volts, 3 phase 50 HZ TPN high conductivity electrolytic Aluminium bus bar with conductivity on min 57 to 58% of suitable length, SMC / DMC supports, with colour coding and insulated by heat shrinkable sleeves and clips on shrouds for joints. The current density of bus bar shall be minimum 1.30 sq mm / amp.				
	The Maximum allowable temperature for the Bus bar to be restricted to 85 deg C. The temperature rise should be restricted to 35 deg C above ambient temperature.				
	OUTGOINGS -				
	10 nos. of 125 AMPS TPN 50 KA MCCB and capacitor duty contactor with 50 KVAR (2 X 25 KVAR) heavy duty MPP type at 415 V capacitor bank (rated Voltage 440 Volts) , auto-manual selector switch, start stop push button for manual operation including on/off indicating lamps and delay timer complete.				
	2 nos. of 63 AMPS TPN 50 KA MCCB and capacitor duty contactor with 25 KVAR heavy duty MPP type at 415 V capacitor bank (rated Voltage 440 Volts) , auto-manual selector switch, start stop push button for manual operation including on/off indicating lamps and delay timer complete.				
	1 no. of 63 AMPS TPN 50 KA MCCB and capacitor duty contactor with 20 KVAR heavy duty MPP type at 415 V capacitor bank (rated Voltage 440 Volts) , auto-manual selector switch, start stop push button for manual operation including on/off indicating lamps and delay timer complete.				
	1 no. of 40 AMPS TPN 50 KA MCCB and capacitor duty contactor with 15 KVAR heavy duty MPP type at 415 V capacitor bank (rated Voltage 440 Volts) , auto-manual selector switch, start stop push button for manual operation including on/off indicating lamps and delay timer complete.				
	1 no. of 32 AMPS TPN 50 KA MCCB and capacitor duty contactor with 10 KVAR heavy duty MPP type at 415 V capacitor bank (rated Voltage 440 Volts) , auto-manual selector switch, start stop push button for manual operation including on/off indicating lamps and delay timer complete.				
	1 no. of 16 AMPS TPN 50 KA MCCB and capacitor duty contactor with 5 KVAR heavy duty MPP type at 415 V capacitor bank (rated Voltage 440 Volts) , auto-manual selector switch, start stop push button for manual operation including on/off indicating lamps and delay timer complete.	1	Set		

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
3	**L T Breaker (near Transformer) (2000 KVA Transformer)**				
	Supply, testing and commissioning of 3200 AMP. Four Pole, Manually operated 3 position fixed type **Air Circuit Breaker** with all builtin protections, with microprocessor based releases/relays, over current, earth fault, short circuit, Instantaneous over current, closing coil (220 V AC), trip coil (24 V DC), 50 KA Breaking Capaciy with all standard accessories i.e. auxillary switch, protection CT's with 4NO + 4NC contacts, cradle, handle, safety shutter in confirmity with IS:13947-2. The ACB will be provided with digital type ammeter with selector switch and CT's, 3 Nos. LED type phase indicating lamps, each lamp shall be with bakup HRC fuse/MCB along with hooter, auxillary relay, 2 sets of push buttons, 4 Nos. LED type indicating lamp for indicating the status of feeder - ON / OFF / TRIP due to over current, TRIP due to earth fault. Each lamp shall be with bakup HRC fuse/MCB.				
	ACB and Release Make / model :- ABB E-max (PR121), L&T-U Power (MTX 1.0G), Schneider - Master Pact - MVS (Micrologic 6.0G), Siemens - 3WT (ETU45B), Legrand - DMX^3 (MP4-LSIG)				
	The ACB will be provised inside **outdoor type enclosure** of suitable size made out of CRCA M.S. sheet 2 mm thick (14 SWG) with locking arrangement (IP-54), powder coated after proper treatment with 9 tank process, duly fixed on MS angle iron frame work of size 50mm x 50mm x 6mm, 90 cm long legs out of which 45 cm duly grouted in cement concrete 1:2:4 (1 cement : 2 sand :4 stone aggrete 20mm), The sheet steel shall undergo minimum 9 tank treatment followed by finishing powder coating of min 60 micron thickness. The bottom having removable gland plates, as required, double compression type cable glands, earth bus, hinged and lockable doors to achieve dust and vermin proof complete with all inter connections small wiring by min. 2.5 sq. mm. FRLS copper wires, ckt labels etc. The Aluminium Bus Bar shall be of suitable length, 500 volts, 3 phase 50 Hz TPN, electrolytic aluminium as per IS 8623 . The panel feeders shall be suitable for terminating suitable nos. 3.5 / 4 core armoured aluminium cable	1	Set		
4	Design, manufacture, supply, testing and commissioning of **Common Services Panel - 1 / 2 / 3 (For Tower - A, B, C)** fabricated out of 16 SWG CRCA sheet steel, IP 42, wall / floor mounting type. The sheet steel shall undergo minimum 9 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 V electrolitic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	The Panel shall have 3 nos 3 Phase electronic type KWHR meter with RS 485 communication port, CT's with accuracy class 1.0 , control circuits, MCB and wiring as per SLD.				
	For connection of above KWH meter & Bus bar refer submitted SLD along with the BOQ.				
	The incoming MCCB shall be microprocessor based with inbuilt O/L & S/C release with E/F protection and all Outgoings MCCB's shall be thermal-magnetic based with inbuilt O/L & S/C release.				
	All MCCB's shall be Ics = 100% Icu, with rotary handle & pad locking arrangement, with adjustable O/L & S/C trip setting as per load requirement. All TP MCCB shall be with solid isolable neutral link. The breaking capacity specified is Ics value. All outgoing MCB's shall be C type with 15 KA breaking capacity.				
	Mix & Match famlies / makes of MCCB's / MCB's shall not be allowed, They are all of same manufacturer.				
	The above board shall be complete with 3 nos. phase indicating lights, flush mounted Ammeter, Voltmeter, CT's, PT's, selector switches, protective fuses etc. at Incomer with all inter connections by min. 2.5 sq.mm. Copper wires.				
	INCOMER : 160 AMP FP MCCB (25 KA)				
	BUS BAR : 200 AMP, 500 Volts, 3 phase 50 HZ FP (with 100% neutral) high conductivity electrolytic Aluminium bus bar with conductivity of min 57 to 58% of suitable length, insulated by heat shrinkable sleeves. The current density of bus bar shall be minimum 1.00 sq mm / amp.				
	The Maximum allowable temperature for the Bus bar to be restricted to 85 deg C. The temperature rise should be restricted to 35 deg C above ambient temperature.				
	OUT GOINGS :				
	2 nos 125 AMP TP MCCB (25 KA)				
	1 no 63 AMP FP MCB (10 KA)				
	2 no 40 AMP FP MCB (10 KA)				
	9 no 40 AMP DP MCB (10 KA)	3	SET		
5	Design, manufacture, supply, testing and commissioning of **Common Services Panel - 4 / 5 (For Tower - 1 & 2)** fabricated out of 16 SWG CRCA sheet steel, IP 42, wall / floor mounting type. The sheet steel shall undergo minimum 9 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 V electrolitic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	The Panel shall have 3 nos 3 Phase electronic type KWHR meter with RS 485 communication port, CT's with accuracy class 1.0 , control circuits, MCB and wiring as per SLD.				
	For connection of above KWH meter & Bus bar refer submitted SLD along with the BOQ.				
	The incoming MCCB shall be microprocessor based with inbuilt O/L & S/C release with E/F protection and all Outgoings MCCB's shall be thermal-magnetic based with inbuilt O/L & S/C release.				
	All MCCB's shall be Ics = 100% Icu, with rotary handle & pad locking arrangement, with adjustable O/L & S/C trip setting as per load requirement. All TP MCCB shall be with solid isolable neutral link. The breaking capacity specified is Ics value. All outgoing MCB's shall be C type with 15 KA breaking capacity.				
	Mix & Match famlies / makes of MCCB's / MCB's shall not be allowed, They are all of same manufacturer.				
	The above board shall be complete with 3 nos. phase indicating lights, flush mounted Ammeter, Voltmeter, CT's, PT's, selector switches, protective fuses etc. at Incomer with all inter connections by min. 2.5 sq.mm. Copper wires.				
	INCOMER : 200 AMP FP MCCB (25 KA)				
	BUS BAR : 200 AMP, 500 Volts, 3 phase 50 HZ FP (with 100% neutral) high conductivity electrolytic Aluminium bus bar with conductivity of min 57 to 58% of suitable length, insulated by heat shrinkable sleeves. The current density of bus bar shall be minimum 1.00 sq mm / amp.				
	The Maximum allowable temperature for the Bus bar to be restricted to 85 deg C. The temperature rise should be restricted to 35 deg C above ambient temperature.				
	OUT GOINGS :				
	2 nos 160 AMP TP MCCB (25 KA)				
	1 no 63 AMP FP MCB (10 KA)				
	2 no 40 AMP FP MCB (10 KA)				
	9 no 40 AMP DP MCB (10 KA)	2	SET		
6	Design, manufacture, supply, testing and commissioning of **Elevator panel - 1 / 2 / 3 (For Tower - A, B & C)** fabricated out of 16 SWG CRCA sheet steel, IP 4X, wall / floor mounting type. The sheet steel shall undergo minimum 9 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 V electrolytic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	Surge Protection Device - Type - 02 (Class - C), 8 / 20 µ sec. (20KA per pole), with HRC fuses for protection.				
	The incoming MCCB shall be thermal-magnetic based with inbuilt O/L & S/C release with E/F protection and all Outgoings MCCB's shall be thermal-magnetic based with inbuilt O/L & S/C release.				
	All MCCB's shall be Ics = 100% Icu, with rotary handle & pad locking arrangement, with adjustable O/L & S/C trip setting as per load requirement. All TP MCCB shall be with solid isolable neutral link. The breaking capacity specified is Ics value. All outgoing MCB's shall be C type with 10 KA breaking capacity.				
	Mix & Match famlies / makes of MCCB's / MCB's shall not be allowed, They are all of same manufacturer.				
	The Panel shall have a provision for AUTOMATIC FIRE DETECTION GAS SUPPRESSION flooding system for complete panel of each compartment / section including gas bank of required capacity (Note - Gas Suppression flooding sysytem having seperate item).				
	The above board shall be complete with 3 nos. phase indicating lights, flush mounted Ammeter, Voltmeter, CT's, PT's, selector switches, protective fuses etc. at Incomer with all inter connections by min. 2.5 sq.mm. Copper wires.				
	INCOMER : 125 AMP FP MCCB (25 KA)				
	BUS BAR : 200 AMP, 500 Volts, 3 phase 50 HZ FP (with 100% neutral) high conductivity electrolytic Aluminium bus bar with conductivity of min 57 to 58% of suitable length, insulated by heat shrinkable sleeves. The current density of bus bar shall be minimum 1.00 sq mm / amp.				
	The Maximum allowable temperature for the Bus bar to be restricted to 85 deg C. The temperature rise should be restricted to 35 deg C above ambient temperature.				
	OUT GOINGS				
	3 nos 63 AMP TP MCCB (25 KA)				
	2 nos 32 AMP FP MCB (10 KA)				
	3 nos 63 AMP DP MCB (10KA)	3	SET		
7	Design, manufacture, supply, testing and commissioning of **Elevator panel - 4 / 5 (For Tower - 1 & 2)** fabricated out of 16 SWG CRCA sheet steel, IP 4X, wall / floor mounting type. The sheet steel shall undergo minimum 9 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 V electrolytic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	Surge Protection Device - Type - 02 (Class - C), 8 / 20 µ sec. (20KA per pole), with HRC fuses for protection.				
	The incoming MCCB shall be thermal-magnetic based with inbuilt O/L & S/C release with E/F protection and all Outgoings MCCB's shall be thermal-magnetic based with inbuilt O/L & S/C release.				
	All MCCB's shall be Ics = 100% Icu, with rotary handle & pad locking arrangement, with adjustable O/L & S/C trip setting as per load requirement. All TP MCCB shall be with solid isolable neutral link. The breaking capacity specified is Ics value. All outgoing MCB's shall be C type with 10 KA breaking capacity.				
	Mix & Match famlies / makes of MCCB's / MCB's shall not be allowed, They are all of same manufacturer.				
	The Panel shall have a provision for AUTOMATIC FIRE DETECTION GAS SUPPRESSION flooding system for complete panel of each compartment / section including gas bank of required capacity (Note - Gas Suppression flooding sysytem having seperate item).				
	The above board shall be complete with 3 nos. phase indicating lights, flush mounted Ammeter, Voltmeter, CT's, PT's, selector switches, protective fuses etc. at Incomer with all inter connections by min. 2.5 sq.mm. Copper wires.				
	INCOMER : 160 AMP FP MCCB (25 KA)				
	BUS BAR : 200 AMP, 500 Volts, 3 phase 50 HZ FP (with 100% neutral) high conductivity electrolytic Aluminium bus bar with conductivity of min 57 to 58% of suitable length, insulated by heat shrinkable sleeves. The current density of bus bar shall be minimum 1.00 sq mm / amp.				
	The Maximum allowable temperature for the Bus bar to be restricted to 85 deg C. The temperature rise should be restricted to 35 deg C above ambient temperature.				
	OUT GOINGS				
	4 nos 63 AMP TP MCCB (25 KA)				
	3 nos 32 AMP FP MCB (10 KA)				
	3 nos 63 AMP DP MCB (10KA)	2	SET		
	DISTRIBUTION BOARDS (FOR ELEVATOR ROOM)				
8	Supplying, receiving, storing, handling, erecting, testing and commissioning of **Single Pole and Neutral MCB distribution board**, IP 43 protection, sheet steel, double door, powder coated, 240 volts, in recess/surface, complete with 100 amp tinned copper bus bar, neutral bar, earth bar, top and bottom removable gland plates with knockouts, interconnections, earthing etc. as required. DB's shall be original factory fabricated of approved make.				

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	Make : Legrand-Lexic / L&T / Hager / ABB / Schneider-Acti 9				
	16 WAYS SPN	5	NOS		
9	Supplying, fixing, connecting, testing and commissioning of following rating, ISI marked (IS 8828) 240 / 415 volts, 10 KA, **Miniature Circuit Breaker (MCB)** of single / double / three / four poles in the existing MCB DB or in existing MS enclosure complete in all respects.				
	Make : Legrand-Lexic / L&T / Hager / ABB / Schneider-Acti 9				
	5 to 32 Amp. SP MCB	60	NOS		
	63 Amp DP MCB (10 KA) + 63 Amp DP RCCB (300 mA, type - B)(10KA)	5	NOS		
	TOTAL				

TENDER FOR EXTERNAL ELECTRICAL WORKS

PART – D (SUPPLY & LAYING OF HT & LT CABLES).

NAME OF THE WORK : **"LOGIX BLOSSOM ZEST"**
AT SECTOR - 143 NOIDA (U.P.)

Architect:

Services consultant

cespl
Working Together To Create Value

[Consummate Engineering Services Pvt. Ltd.]

B-67, SECTOR – 67, Noida – 201301 Tel. : (0120) 2303500 (24 Lines)

Lko. Office : R 006, Rohtas Plumeria, Gomti Nagar, Lucknow,

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SPECIFICATIONS FOR HT & LT CABLES WORKS

NAME OF THE WORK : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA (U.P.)

Architect:

Consultants
Consummate Engineering Services Pvt. Ltd.
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CABLES

A. H.T. CABLE (XLPE insulated)

The cross linked polyethylene (XLPE) cable shall be aluminium conductor PVC outer sheath steel strip armoured over inner sheath construction. XLPE cable shall conform to testing in accordance with IS:7098 (Part-I) 1985 and (Part-II) 1973. The screening shall be done on individual cover. The armouring applied over the common covering shall be flat steel wires. Each and every length of cable shall be subjected to routine test.

The termination and jointing techniques for XLPE cables shall be by using heat shrinkable or push on cable jointing kits.

While laying underground cables in ducts care should be taken so that any underground structures such as water pipes, sewerage lines etc. are not damaged. Any telephone or other cable coming in the way shall be properly protected as per instructions of the Engineer-in-charge.

After laying and jointing work is completed a high voltage test shall be performed and test results submitted for approval in order to ensure that they have not been damaged during or after the laying operation. In case, the test results are unsatisfactory, the cost of all repairs and replacement and all extra work of removal and relaying will be made good by the contractor without any extra cost.

B. LOW VOLTAGE (L.V.) CABLES

1. Wires

The design manufacture, testing and supply of single core FRLS PVC insulated 1.1 KV grade stranded twisted wires under this specifications shall comply with latest edition of following standards.

IS : 3961 Current rating for cables.

IS : 5831 HRPVC/PVC insulation and sheath of electric cables.

IS : 694 HRPVC/PVC insulated cables for working voltage upto and including 1100 volts.

IEC : 754(i) FRLS PVC/HFFR insulated cable.

Copper/Aluminium stranded twisted conductor HRPVC / FRLS PVC / PVC insulated wires shall be used in conduit as per item of work. Aluminium for power cables and copper for control cables shall be used.

The wires shall be colour coded R Y B, for phases, Black for neutral and Green for earth.

Progressive automatic in line indelible, legible and sequential marking of the length of cable in meters at every one meter shall be provided on the outer sheath of cable.

2. Cables

The design, manufacture, testing and supply of the cable under this specifications shall comply with latest edition of following standards:

IS : 8130	Conductors for insulated electric cables and flexible cords.
IS : 5831	HRPVC/PVC insulation and sheath of electric cables.
IS : 3975	Mild steel wires, strips and tapes for armouring cables.
IS : 3961	Current rating of cables.
IS : 694	HRPVC/PVC insulated (heavy duty) electric cables for working voltage upto and including 1100 volts.
IS : 424-1475 (F-3)	Power cable-flammability test.
IS : 7098(I)	Specification for cross linked polyethylene insulated XLPE/PVC sheathed cable for working voltage upto 1.1 KV.
IS : 1554	Specification for PVC insulated (heavy duty) electric cables for working voltages upto and including 1100 volts.
IS : 10810	Testing method of cable.
IS : 6121	Cable glands.
ASTM-D : 2863	Standard method for measuring the minimum oxygen concentration to support candle-like combustion of plastics (Oxygen Index).
ASTM-D : 2843	Standard test method for measuring the density of smoke from the burning or decomposition.
IEEE : 383	Standard for type of test Class-IE, Electric cables, field splicers and connections for power generation station.
ASTME : 662IEC : 754 (A)	Standard test method for specific optical density of smoke generated by solid materials.
IS : 10418	Cable drums.

3. Technical Requirements

a) The cables shall be suitable for laying in racks, ducts, trenches conduits and under-ground buried installation with uncontrolled back fill and chances of flooding by water.

b) They shall be designed to withstand all mechanical, electrical and thermal stresses under steady state and transient operating condition.

c) The aluminium/copper wires used for manufacturing the cables shall be true circular/sector in shape before stranding and shall be of uniformly good quality, free from defects. The conductor used in manufacture of the cable shall be of H2 grade.

d) The cable should withstand 1 – 50 KA for 1 sec with insulation armour insulated at one end. Bidder shall furnish calculation in support of capability to withstand the earth fault currents. The current carrying capacity of armour and screen (as applicable) shall not be less than the earth fault current values and duration. Copper screen of each core shall be suitable for carrying full fault/earth current.

e) The fillers and inner sheath shall be of non-hygroscopic fire retardant materials and shall be suitable for the operating temperature of the cable. Filler and inner sheath shall not stick to insulation and outer sheath.

f) Progressive automatic in line indelible, legible and sequential marking of the length of the cable in meters at every one meters shall be provided on the outer sheath of all cables and at every 5 meter ‘FRLS’ marking in case of ‘FRLS’ cables.

g) Strip/Wire armouring following method (b) mentioned in IS:3975 shall only be acceptable. For single core cable aluminium wire armouring shall be used.

h) Allowable tolerance on the overall diameter of the cables shall be + 2mm.

i) The normal current rating of all PVC insulated cables shall be as per IS:3961.

j) A distinct inner sheath shall be provided by pressure extrusion process for all multicore armoured and unarmoured cables as per IS:5831.

k) Outer sheath shall be provided by extrusion process as per IS:5031.

l) The breaking load of armour joint shall not be less than 95% of that armour wire. Zinc rich paint shall be applied on armoured joint surface.

m) In plant repairs to the cables shall not be accepted.

n) All the cables shall be supplied in non-returnable drums as per IS:10418.

4. FRLS Cables

i) The inner and outer sheath of cables shall have an oxygen index of not less than 29 as per ASTMD : 2863.

ii) The maximum acid gas generation by weight as per IEC:754 (i) shall not be more than 20% for outer sheath material of all cables. Bidder shall also guarantee the maximum theoretical acid gas generation with 20% by weight of outer sheath.

iii) The cables inner and outer sheath shall meet the requirement of light transmission of 40% (minimum and shall be tested as per ASTMD:2843). In case the test for

light transmission is conducted as per ASTME:662. The bidder shall furnish smoke density values as per this standard and shall co-relate the anticipated light transmission when tested as per ASTMD:2843.

iv) The cable shall pass the fire resistance test as per SS:42, 41, 475 (I) and flammability test as per IEEE:383.

v) Smoke/light density rated shall be 40% (minimum) and 65% (maximum).

5. Inspection

All cables shall be inspected at manufacture place and on receipt of the same at site checked for any damage during transit.

6. Joint in Cables

The contractor shall take care that the cables received at site are distributed to various locations in such a manner as to ensure maximum utilization and avoidance of cable jointing. Cable shall be rechecked before cutting in lengths, where the joints are unavoidable, the location of such joints shall be got approved from the Owner/Consultant. The joints shall be done by qualified jointer strictly in accordance with manufacturer's instruction/drawings.

7. Joint Boxes For Cables

The cable joint boxes shall be of appropriate size suitable for type of cable of particular voltage rating.

8. Jointing of Cables

All cable joints shall be made in suitable, approved cable joints boxes, on the jointing of cables in the joint box and the filling in of compound shall be done in accordance with manufacturer's instructions and in an approved manner. All straight through joints shall be done in epoxy mould boxes with epoxy resins. Straight through joints shall not be permitted unless the length of run is in excess of cable drum.

End terminations of cables more than 1.1 KV grade shall be done with epoxy mould boxed and epoxy resin. Cable glands shall be 1.1KV grade double compression type and made to tin plated heavy duty brass casting and machine finished. Glands shall be of robust construction capable of clamping cable and cable armour, firmly without injury of cable.

All washers and hardwares shall be made of brass tinned. Rubber components used in the glands shall be made of neoprene of tested quality.

Cable lugs shall be tinned copper/aluminium solderless crimping type conforming to IS:8309 suitable for aluminium or copper conductor.

Crimping of terminals shall be done by using Corrosion inhibitory compound, with crimping tool.

The contractor shall liaise fully with all other contractors to achieve an efficient and properly coordinated installation where equipment has to be re-positioned due to lack of site liaison, no extra cost shall be incurred by the client.

9. Testing of Cables

Cables shall be tested at factory as per requirement of IS:1554 Part-I. The tests shall incorporate routine tests, type tests and acceptance tests. Prior to dispatch of cables. All the testes will be witnessed by Employer / Consultant in accordance with testing procedure approved by Consultant at no extra cost to Employer. Besides that the following tests shall be carried out:

a) Insulation test between phases and phase to earth for each length of cable before and after jointing.

On completion of cable laying work, the following test shall be conducted in the presence of Architect/Owner.

a) Insulation resistance test (Sectional and overall) 1000/5000V depending upon the voltage grade of cable.
b) Continuity test.

10. Laying of Cable

The cable drum shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming kinks. At all changes in directions in horizontal & vertical places, the cable shall be bent with a radius of bend not less than 12 – 15 times diameter and 8 times only at places of space constraints.

The cable of 1.1KV grade shall be laid not less than 750mm below ground level in a 375mm wide trench (throughout), where more than one cable is to be laid in the same trench, the width of the trench shall be increased such that the interaxial spacing between the cables except where otherwise specified shall at least be 150mm minimum or as per site requirements or as approved by the Engineer-in-charge. Where single core cables are used in multiphase systems, the cables shall be installed in trefoil where possible.

In case the cables are laid in vertical formation due to unavoidable circumstance the depth per tier shall be increased by 200mm (minimum). Cable shall be laid in reasonably straight line, where a change in direction takes place a suitable curvature shall be i.e. either 20 times the dia meter of the cable or the radius of the bend shall not be less than twice the diameter of the cable drum or whichever is less. Minimum 3 meter long loop shall be provided at both sides of every straight through joint & 3 meters at each end of cable or as directed at site.

Greater care shall be exercised in handling the cable in order to avoid forming ‘Kinks’. The cable drum shall in-verbally conveyed on wheels and the cable unrolled in right direction as indicated on the drum by the manufacturer. The cable shall be pulled over rollers in the trench steadily and uniformly without jerks and strains.

Cables laid in trenches in single tier formation, 10 cms. in total sand cushioning be provided below and above the cable before a protective cover is laid. For every additional vertical tier. The 30cm of sand cushion be provided over the initial tier. The cable shall be protected by 2nd class bricks of size not less than 230x115x75mm, stone tiles/RCC curved channel be placed on top of the sand breadth wise for the full length of the cable and where more than one cable is to be laid in the same trench the brick shall cover all cables and project at least 8 cms. over the outer sides of the end cables.

Filling of trenches shall be done after the sand cushioning and laying of tiles or bricks are carried out to the satisfaction of the Engineer-in-charge (Refer drawing). Back fill for trenches shall be filled in layer not exceeding 150 mm. Each layer shall be properly rammed & consolidate before laying the next layer.

RCC pipe shall be provided for all road crossing. The size of the pipe shall be according to the cable and a minimum 100mm dia. pipe shall be provided. The pipe shall be laid in ground with special arrangement and shall be cement jointed and concreting shall be made as per relevant IS with latest amendment. Nothing extra shall be paid on this account. Location of cables laid directly underground shall be indicated by cable marker at an interval of 30 meters & with change of direction. Aluminium strip cable tag of 20mm wide with engraved tag no. shall be provided at both ends of cable.

Where the cables are to be laid in ducts (masonry trenches) in side the building, they will have to be laid on MS rack/ on MS cable trays grouted in walls trenches. Cables sizing through floors shall be protected from mechanical damage by a steel channel to a height of one meter above the floor where cable pass through wall they shall be sleeved with PVC/steel conduit.

Where the cables are laid in open (in building) along walls, ceiling or above false-ceiling, cable rack (ladder type) or cable tray shall be provided. The size of the cable tray or rack shall depend on the number of cables to pass over that rack. Cable tray/rack shall be properly supported through wall/ceiling according to the site conditions. Cable laid on tray & riser shall be neatly dressed &clamped at an interval of 1000 mm & 750mm for horizontal & vertical cable run respectively either side at each bend of cable. All power cables shall be clamped individually & control cables shall be clamped in groups of three or four cables. Clamps for multicore cables shall be fabricated of 25x3 GI flats. Single core power cable shall be laid in trefoil formation & clamped with trefoil clamps made of PVC/fiber glass.

Cable openings in wall/floor shall be sealed by the contractor suitably by Hessian tape & bitumen compound or by any other proven to prevent ingress of water.

After the cables are laid, shall be tested as per IS and the results submitted to Architects/Engineer and in case the results found unsatisfactory, all the repairing/ replacing of cables will be done by the contractor free of charge.

Cable shall be installed so that separation shown in the table below are observed.

HV Cable	-	HV Cable	50 mm
ELV & LV 230 V/433 V	-	ELV & LV cable 230 V/433 V	50 mm
HV cables	-	ELV & LV cables 230 V/433 V	300 mm
LV cables 433 V	-	Telephone/Instrument cable	350 mm
All cables	-	All wet / hot pipe work	600 mm

LIST OF APPROVED MANUFACTURERS FOR ELECTRICAL WORKS

S.NO.	DESCRIPTION	MANUFACTURER'S NAME
1	PVC insulated Copper conductor wires	Finolex / RR / Polycab / Skytone
2	PVC / XLPE INSULATED 33 KV CABLES	Finolex / Polycab / Skytone
3	PVC / XLPE INSULATED 1.1 KV CABLES	Finolex / Polycab / Skytone / RR
4	CONTROL CABLES / WIRES	Finolex / Polycab / Skytone / RR
5	H.V. CABLE TERMINAL JOINTS	RAYCHEM / 3 M / M-seal
6	LUGS	DOWELLS / 3D / 3 M / Comet / Hex
7	CABLE GLANDS	SIEMENS / COMET / GRIPPWEL
8	Any Other Items	On approval of consultant or Engg in charge

NOTE :

1	The choice of the Final makes shall be made by the owner / consultant.
2	The samples or Cat. No. of all type of switches & light fittings should be approved before execution.

	SCHEDULE OF QUANTITIES FOR ELECTRICAL INSTALLATIONS				
	PROJECT : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA. (FOR TOWER A, B, C, 1 & 2 ONLY)				
	PART (D) - SUPPLY & LAYING OF HT & LT CABLES				
	IMPORTANT NOTE - COMPLETE ELECTRICAL SCHEME TO BE APPROVED FROM UPPCL DEPARTMENT, BEFORE START ANY DESIGNING / FABRICATION.				
S.No	**DESCRIPTION**	**QTY**	**UNIT**	**RATE**	**AMOUNT**
	SUPPLY AND LAYING OF CABLES & ACCESSORIES				
1	Supply of ISI marked aluminium conductor **XLPE insulated cable** as per IS 7098, armoured, served, sheathed 1100 volts grade.				
	(Make : Finolex / Polycab / Skytone / RR)				
	3 1/2 x 50 Sqmm	210	M		
	3 1/2 x 70 Sqmm	590	M		
	3 1/2 x 95 Sqmm	310	M		
	3 1/2 x 120 Sqmm	670	M		
	3 1/2 x 240 Sqmm	1,040	M		
	3 1/2 x 300 Sqmm	6,550	M		
2	Supply of 1000V grade bare **copper conductor** XLPE **low smoke halogen free insulated** with fire rated glass mica tape LSZH inner and outer sheathed armored fire survival cable, having fire resistance and all other parameters conforming to IS-17505. (For Elevator and Fire Fighting System).				
	(Make : Polycab / Frtek / RR)				
	4 x 10 Sqmm	120	M		
	3 1/2 x 300 Sqmm	440	M		
3	**Laying** and testing of aluminium / copper conductor **cable** PVC / XLPE insulated armoured, served, sheathed 1100 volts grade. On surface the cable run shall be fixed by GI clamps etc. of suitable size or **on existing cable tray or inside existing RCC / HDPE DWC pipe** complete in all respect .The armouring of the cable shall be properly connected with the earth conductor including fixing of palm or pin type copper tin plated cable socket (lug) / end terminations to the cable leads, insulating with tape and making connections with brass / nickle plated flame proof double compression glands, providing cable tags complete in all respect upto the satisfaction of Engineer-in-charge. (The supply of terminations and glands shall be under seperate item)				
	4 x 10 Sqmm	120	M		
	3 1/2 x 50 Sqmm	210	M		
	3 1/2 x 70 Sqmm	590	M		
	3 1/2 x 95 Sqmm	310	M		
	3 1/2 x 120 Sqmm	670	M		
	3 1/2 x 240 Sqmm	1,040	M		

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	3 1/2 x 300 Sqmm	6,990	M		
4	Supply of 3 core stranded aluminium conductor **33KV grade XLPE (E)** (Cross linked Polyethylene) insulated PVC bedded, Galvanised flat steel strip armoured **cable** confirming to IS : 7098 (part II with latest amendments)				
	(Make : Finolex / Polycab / Skytone)				
	300 sq. mm 3 core	600	M		
5	**Laying** and testing of 3 core stranded aluminium conductor XLPE insulated armoured cable 33 KV grade, at a depth of 1050 mm below ground level over a cushion of 100 mm thick fine river sand alround and protected with well burnt bricks on sides and on top put across or on surface fixed on GI clamps or on cable trey or inside pipe etc as required **excluding the supply of sand, bricks** and clamps etc. The armouring of the cable shall be properly connected with earth conductor by clamps etc.				
	300 sq. mm 3 core	600	M		
6	Supply fixing of plam type heavy duty aluminium **cable socket (lug)** to the cable leads, insulating with tape and making connections etc. complete in all respects as per direction of Engineer-in-charge.				
	25 sq.mm.	6	NOS		
	35 sq.mm.	8	NOS		
	50 sq.mm.	20	NOS		
	70 sq.mm.	28	NOS		
	95 sq.mm.	6	NOS		
	120 sq.mm.	20	NOS		
	150 sq.mm.	56	NOS		
	240 sq.mm.	24	NOS		
	300 sq.mm.	168	NOS		
7	Supply fixing of plam type heavy duty Copper **cable socket (lug) (for Fire Survival Cable)** to the cable leads, insulating with tape and making connections etc. complete in all respects as per direction of Engineer-in-charge.				
	10 sq.mm.	96	NOS		
	150 sq.mm.	4	NOS		
	300 sq.mm.	12	NOS		
8	Supply and fixing brass nickle plated flame proof double **compression glands** for PVC / XLPE insulated armoured, served, sheathed cable including rubber ring etc. complete in all respect. The armouring of the cable shall be properly connected with the earth conductor.				
	10 sqmm 4 core	24	NOS		
	50 sqmm 3 1/2 core	6	NOS		
	70 sqmm 3 1/2 core	8	NOS		

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	95 sqmm 3 1/2 core	2	NOS		
	120 sqmm 3 1/2 core	4	NOS		
	240 sqmm 3 1/2 core	8	NOS		
	300 sqmm 3 1/2 core	60	NOS		
9	Supply and making **Indoor end termination Kit** of 33 KV XLPE cable. (Make : Raychem / 3M)				
	33 KV 3 x 240-400 Indoor Kit	13	Set		
10	Supply and making **Outdoor end termination Kit** of 33 KV XLPE cable. (Make : Raychem / 3M)				
	33 KV 3 x 240-400 Outdoor Kit	1	Set		
	TOTAL				

TENDER FOR EXTERNAL ELECTRICAL WORKS

PART – E (INSTALLATION OF HT / LT PANEL, T/F, EARTHING & LIGHTNING ARRESTER ETC.)

NAME OF THE WORK : **"LOGIX BLOSSOM ZEST"**
AT SECTOR - 143 NOIDA (U.P.)

ARCHITECT:

Services consultant

cespl
Working Together To Create Value

[Consummate Engineering Services Pvt. Ltd.]

B-67, SECTOR – 67, Noida – 201301 Tel. : (0120) 2303500 (24 Lines)

Lko. Office : R 006, Rohtas Plumeria, Gomti Nagar, Lucknow,

e mail : mail@cespl.in

LIST OF APPROVED MANUFACTURERS FOR ELECTRICAL WORKS

S.NO.	DESCRIPTION	MANUFACTURER'S NAME
1	MCB / RCCB / RCBO / DB	Legrand / Schneider / Hager / L&T / ABB / Indo Asian
2	Industrial outlet	Legrand / Schneider / Hager / L&T / ABB / Indo Asian
3	MCCB (Microprocessor)	ABB (Tmax) / L & T (D sine) / Schnieder (Compact NXS / NS) / Siemens (3VL) / Legrand (DPX)
4	MCCB (Thermo-Magnetic)	ABB (Tmax) / L & T (D sine) / Schnieder (Easypact CVS / Compact) / Siemens (3VT / 3VL) / Legrand (DPX)
5	MPCB (Microprocessor)	ABB / L & T / Schneider / Siemens / Legrand
6	AIR CIRCUIT BREAKER	ABB (E max) / L & T (U power Omega) / Schneider (Masterpact MVS / NW) / Siemens (3WL) / Legrand (DMX^3)
7	SWITCH FUSE UNIT WITH HRC FUSES	L & T / Siemens / ABB / Schneider
8	CONTACTORS / RELAYS	L & T / Siemens / ABB / Schneider
9	CT / PT	L&T, Kappa / AE / ECS / Kalpa
10	Ammeters / Voltmeters and metering equipments	L & T / Siemens / Automatic Electric / Neptune / enercon / Secure / Rishabh
11	Energy Analyser (with RS 485 port)	Enercon / L & T / CONZERV / Rishabh
12	Selector Switches	Kaycee / Salzar / L&T
13	LED Lamps	L&T / Vaishno / Siemens
14	Change Over Switches	GE / L&T / HH Elcon / ABB
15	PVC insulated Copper conductor wires	Finolex / RR / Polycab / Skytone
16	PVC / XLPE INSULATED 33 KV CABLES	Finolex / Polycab / Skytone
17	PVC / XLPE INSULATED 1.1 KV CABLES	Finolex / Polycab / Skytone / RR
18	CONTROL CABLES / WIRES	Finolex / Polycab / Skytone / RR
19	L.T. Fire Survival Cable	Polycab / RR / Frtek
20	H.V. CABLE TERMINAL JOINTS	RAYCHEM / 3 M / M-seal
21	LUGS	DOWELLS / 3D / 3 M / Comet / Hex
22	CABLE GLANDS	SIEMENS / COMET / GRIPPWEL

LIST OF APPROVED MANUFACTURERS FOR ELECTRICAL WORKS

S.NO.	DESCRIPTION	MANUFACTURER'S NAME
23	CABLE TRAY	Indiana / Bharti / Slotco / Steelways / Profab / Rico / MEM / Dynamic / RST / Vidhyut .
24	MS Conduits and Accessories	B.E.C. / AKG
25	PVC Conduits and accessories	AKG / BEC / Finolex / Polycab / ATUL
26	Computer networking - outlets, cables and accessories	AMP / Systemax / Lucent / Schneider / Legrand
27	UPS	Emerson / APC
28	Main L T PANEL, Sub Panels & Bus Duct / Rising mains Fabricators	Tricolite / Ambit / Adlec / Advance (Delhi) / RST / Vidhyut Control / Neptune / Dynamic
29	PLC	ALLEN BRADLEY / SIEMENS / MITSUBISHI / ABB
30	SPD'S	Schneider, DEHN, Furse.
31	BUS DUCT / RISING MAINS (Sandwitch type)	Legrand-Zucchini / Schneider / L&T-Henikwon / C&S / Siemens / GE / Godrej
32	Aluminium Bus Bars	Electrolytic grade - Hindalco / Jindal
33	Copper Bus Bars	Electrolytic grade - Rachna Metal / Libu Metal
34	Capacitor	DUCATI / Epcos / ABB / L&T / Schneider
35	APFC relay	L &T / DUCATI / Seimens/ Epcos / ABB / Schneider
36	BATTERY CHARGING PANEL	KELTRON / NELCO / VOLT STAT
37	BATTERIES	EXIDE / AMCO / STANDARD / Prestolite
38	Earthing / Lightning Protection	Erico / Furse / DHEN / OBO / CAPE
39	Fire Sealant	Birla 3M / HILTI / Nu Green
40	Any Other Items	On approval of consultant or Engg in charge

NOTE :

1	The choice of the Final makes shall be made by the owner / consultant.
2	The samples or Cat. No. of all type of switches & light fittings should be approved before execution.

	SCHEDULE OF QUANTITIES FOR ELECTRICAL INSTALLATIONS				
	PROJECT : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA. (FOR TOWER A, B, C, 1 & 2 ONLY)				
	PART (E) - BALANCE WORKS				
	IMPORTANT NOTE - COMPLETE ELECTRICAL SCHEME TO BE APPROVED FROM UPPCL DEPARTMENT, BEFORE START ANY DESIGNING / FABRICATION.				
S.No	**DESCRIPTION**	**QTY**	**UNIT**	**RATE**	**AMOUNT**
1	**INSTALLATION OF 33 KV PANELS.**				
	The instalation of panels will include receiving, storing, handling, installation, testing and commissioning, affecting proper connections with the power and control cables, coordination with the Panel manufacturers, civil contractors etc complete in all respects. The small items such as nut, bolts and other accesories required for erection of panel will be included in the rates. (The civil work for the foundation will be seperate)				
a	33 KV unit VCB Panel	1	SET		
b	33 KV - 3 VCB Panel	1	SET		
c	33 KV - 2 VCB Panel	1	SET		
2	**Instalation of Transformer** - The instalation of Transformer will include receiving, storing, handling, installation, testing and commissioning, affecting proper connections with the power and control cables, coordination with the transformer manufacturers / supplier, civil contractors etc complete in all respects. The small items / accessories required for erection of transformer will be included in the rates. (The civil work for the foundation will be seperate)				
a	2000 KVA	1	SET		
3	**INSTALLATION OF PANELS (Supply under separate part of Tender)**				
	The instalation of panel will include receiving, storing, handling, installation, testing and commissioning, affecting proper connections with the power and control cables, coordination with the Panel manufacturers, civil contractors etc complete in all respects. The small items such as nut, bolts and other accesories required for erection of panel will be included in the rates.				
a	Main Common Services L T Panel	1	SET		
c	APFC Panel (600 KVAR for 2000 KVA Transformer)	1	SET		
c	L T Breaker (near Transformer)	1	SET		
d	Common Services Panel	5	SET		
e	Elevator Panel	5	SET		

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	CABLE TRAY				
4	Supply and erection of **Perforated type cable trays** made out of prefabricated Galvanized sheet steel including tees, bends, crossings, reducers, couplings to be laid in cable trenches or installed over head on wall or hanged from ceiling including all neccessary supports, brackets at every 1500 mm c/c, grouting, levelling, suspention and fixing arrangements, dash fastners, G.I. nuts & bolts complete in all respects.				
	The support for 1000mm, 900 mm and 750 mm wide cable tray will be by 50 x 50 x 6 mm MS angle, for 600mm and 450 mm wide cable tray will be by 40 x 40 x 5 mm MS angle, for 300mm wide cable tray will be by 32 x 32 x 5 mm MS angle, for 150mm wide cable tray will be by 25 x 25 x 4 mm MS angle.				
	900 mm (W) X 50 mm (H) X 2 mm (T)	660	M		
	750 mm (W) X 50 mm (H) X 2 mm (T)	160	M		
	600 mm (W) X 50 mm (H) X 2 mm (T)	10	M		
	450 mm (W) X 50 mm (H) X 2 mm (T)	330	M		
	300 mm (W) X 35 mm (H) X 1.5 mm (T)	300	M		
	150 mm (W) X 35 mm (H) X 1.5 mm (T)	200	M		
5	Supply and erection of pregalvanized **Ladder type cable trays** made out 25mm x 75mm x 25mm x 2.5mm GI Section all along (as runner) and 20mm x 30mm x 20mm x 2.5 mm GI Section (as rungs) at every 250mm interval c/c including tees, bends, crossings, reducers, couplings to be laid over head on wall or hanged from ceiling including all neccessary supports, brackets (50x50x6 MS Angle) at every 1500 mm c/c, grouting, levelling, suspention and fixing arrangements, dash fastners, G.I. nuts & bolts complete in all respects.				
	900 mm (W) X 75 mm (H)	100	M		
	750 mm (W) X 75 mm (H)	40	M		
	MISCELLANEOUS ITEMS				
6	Providing and fixing **M.V. danger notice** plate of 200 mm x 150 mm made of mild steel, 2 mm thick and vitreous enamelled painting white on both sides, and with inscription in single red colour on front side as required .	4	NOS		
7	Providing and fixing **H.V. danger notice** plate of 250 mm x 200 mm made of mild steel, 2 mm thick and vitreous enamelled painting white on both sides, and with inscription in single red colour on front side as required .	5	NOS		

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
8	S/F of **shock treatment chart** (prescribed under I.E.rules) duly framed with glass and supported from back with hard board with supply of all material labour T & P etc for proper completion of work. (Approx front area = 1.20 sq M)	1	NOS		
9	Supply and fixing of **First aid box** as approved by Indian red cross conforming to IS : 2217.	1	NOS		
10	Supply of **rubber gloves** of 33 KV grade as per IS : 4770.	1	Set		
11	Supply, laying, jointing, testing and commissioning of ISI marked (IS : 16205 Part -24 (2018) **H.D.P.E. (DWC) Double wall Corrugated pipe for cable laying** having corrugation on outer wall and plain smooth surface at inner side including transportation upto the site, jointing, providing and fixing of sockets and couplers etc including excavation in all kind of soil upto 1 meter depth of suitable width with back filling of soil into trenches to complete the works in all respects. (Make : Duraline / Jain / Reliance)				
	120 mm. ID / 160 mm OD	50	M		
12	Supply and fixing of **cable route maker** as directed by Engg-in-charge.	12	NOS		
13	Supplying and laying of 1000 mm wide x 2 mm thick **insulated mat** with glowing strip made from highly electrical resistant elastomer of tested quality to withstand 30 KV dielectric strength as per IS 15652 : 2006 complete in all respects. (For LT Panels) (Makes - Marvel, RMG, Premier, Electromat)	10	M		
14	Supplying and laying of 1000 mm wide x 3.0 mm thick **insulated mat** with glowing strip made from highly electrical resistant elastomer of tested quality to withstand 30 KV dielectric strength as per IS 15652 : 2006 complete in all respects. (For 33 KV panels) (Makes - Marvel, RMG, Premier, Electromat)	10	M		
	EARTHING				
	BODY / SAFETY EARTHING (FOR BODY OF ALL ELECTRICAL EQUIPMENTS LIKE RISING MAINS, TRANSFORMER, DG SETS, LIFTS ETC.				
15	**Maintenance Free Earthing : -** Supply of Low carbon high tensile Copper Bonded Ground rods having min 250 micron of copper coating . The diameter of Rod should be 17.2 mm with the length of 3000 mm . The ground rod should be UL approved and tested from CPRI. The earthing include 400 mm square C.I. frame with hinged cover, masonry housing including excavation and back filling. The Rod should be surrounded with Earth Enhance compound of 25 Kg tested as per IEC 62561-2 for the rod & IEC 62561 -7 for compound. (borh are from same manufacturer) Exothermic welding shall be used for connection between main electrode (copper bonded rod) and copper strip of size 32 x 6 mm. Further GI strips from equipments shall be connected to Copper strips by means of special bi-matellic connector (i.e. stainless steel). **please refer submitted drawing.**	28	NOS		

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
16	Providing & fixing **25mm x 5mm G.I. strip** on surface, in recess or in ground including connections etc. as required (**Elevator Panels).**	1,400	M		
17	Providing & fixing **32mm x 6mm G.I. strip** on surface, in recess or in ground including connections etc. as required **(only Cable Trays. As Rising Mains already installed).**	3,600	M		
18	Providing & fixing **50mm x 6mm G.I. strip** on surface, in recess or in ground including connections etc. as required **(For Pig Tails of Transformers & Main Common Service LT Panel).**	100	M		
19	Providing & fixing **50mm x 10 mm G.I. strip** on surface, in recess or in ground including connections etc. as required **(Main Earth Grid & Interconnecting Strip).**	200	M		
	Neutral Earthing				
20	**Maintenance Free Earthing : -** Supply of Low carbon high tensile Copper Bonded Ground rods having min 250 micron of copper coating . The diameter of Rod should be 17.2 mm with the length of 3000 mm . The ground rod should be UL approved and tested from CPRI. The earthing include 400 mm square C.I. frame with hinged cover, masonry housing including excavation and back filling. The Rod should be surrounded with Earth Enhance compound of 25 Kg tested as per IEC 62561-2 for the rod & IEC 62561 -7 for compound.(borh are from same manufacturer) Exothermic welding shall be used for connection between main electrode (copper bonded rod) and copper strip of size 50 x 6 mm. **please refer submitted drawing.**	2	NOS		
21	Providing & fixing **50mm x 6mm insulated Copper strip** on surface, in recess or in ground including connections etc. as required.	20	M		
22	**LIGHTNING PROTECTION (CONVENTIONAL) AS PER IS - 62305-3:2010** **Vendor / Makes : -** DEHN, FURSE, ERICO, OBO, CAPE & AXIS.				
	Note - Before start working, Vendor should submit final Shop Drawing as per site conditions / requirement after site visit for approvals from architects / consultants.				
23	**Maintenance Free Earting : -** Supply of Low carbon high tensile Copper Bonded Ground rods having min 250 micron of copper coating . The diameter of Rod should be 17.2 mm with the length of 3000 mm . The ground rod should be UL approved and tested from CPRI. The earthing include 400 mm square C.I. frame with hinged cover, masonry housing including excavation and back filling. The Rod should be surrounded with Earth Enhance compound of 25 Kg tested as per IEC 62561-2 for the rod & IEC 62561 -7 for compound. (borh are from same manufacturer) Exothermic welding shall be used for connection between main electrode (copper bonded rod) and copper strip of size 32 x 6 mm. Further GI strips as down conductor (with test joint) shall be connected to Copper strips by means of special bi-matellic connector (i.e. stainless steel). **please refer submitted drawing.**	62	NOS		

S.No	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
a)	Providing & fixing **8 mm dia Al conductor or G.I.tape 20 mm x 3 mm** thick on parapet or surface of wall for lightning conductor complete with providing required numbers of cross connectors, expansion pieces & horizontal conductor holder as required to colplete in all respect. *(All Strip / ROD / Connectors, Holders, Test joint including nuts, washers etc should be UL approved and tested from CPRI).* (For horizontal run).	1,550	M		
b)	Providing & fixing **8 mm dia Al conductor or G.I.tape 20 mm x 3 mm** thick on surface of side wall of building structure with every 20% of height of structure untill reached at 60 mtr for side flash lightning conductor (for building more than 60 mtr in height) complete with providing required numbers of expansion pieces & horizontal / Verticle conductor holder & Earth fixing point as required to complete in all respect *(All Strip / ROD / Connectors, Holders, Test joint including nuts, washers etc should be UL approved and tested from CPRI).*	1,200	M		
c)	Providing & fixing **8 mm dia Al conductor or G.I.tape 20 mm x 3 mm** thick on surface of wall for lightning conductor complete with providing required numbers of cross connectors, expansion pieces & verticle conductor holder as required to complete in all respect *(All Strip / ROD / Connectors, Holders, expansion piece including nuts, washers etc should be UL approved and tested from CPRI)* . (For vertical run)	3,750	M		
d)	Providing and fixing **testing joint**, made of **8 mm dia Al conductor or 20mm. x 3 mm thick G.I. strip**, 125mm. long, with 4 nos of G.I. Bolts & required numbers of nuts, check nuts and spring washers etc.complete in all respect. *(All Strip / ROD / Connectors, Holders, Test joint including nuts, washers etc should be UL approved and tested from CPRI).*	62	Each		
e)	Providing and fixing **interception rod of 2 mtr** height complete with stand, concrete block & supporting base frame etc. to complete in all respect. *(should be UL approved and tested from CPRI including nuts, washers etc).*	7	Each		
f)	Providing & laying **G.I. tape, 25mm x 5 mm** thick, from earth electrode to Test joint directly in ground , with required nos of G.I. Bolts, nuts, check nuts and spring washers etc.complete in all respect. *(All Strip / ROD / Connectors, Holders, Test joint including nuts, washers etc should be UL approved and tested from CPRI).*	1,250	M		
24	Supply, installation, testing & commissioning of **Aviation obstruction light** with LED lamp, toughened clear glass, with all accessories as per standard item, control gear, including 38 mm dia class B G I pipe of suitable length. (Make : Bajaj / Wipro / Surya)	5	Nos		
25	Construction of Meter Room & VCB Room (all Civil works with partition) as direted by UPPCL of Size 6.0 Mtr X 17 Mtr X 3.6 Mtr including trenches, Ventilation as required. (Flooring PCC & Slab - RCC)	1	LS		
	TOTAL				

TENDER FOR EXTERNAL ELECTRICAL WORKS

PART-F (GAS SUPPRESSION SYSTEM FOR MAIN COMMON SERVICES LT PANEL & ELEVATOR PANELS).

NAME OF THE WORK : **"LOGIX BLOSSOM ZEST"**
AT SECTOR - 143 NOIDA (U.P.)

Architect:

Services consultant

cespl
Working Together To Create Value

[Consummate Engineering Services Pvt. Ltd.]

B-67, SECTOR – 67, Noida – 201301 Tel. : (0120) 2303500 (24 Lines)

Lko. Office : R 006, Rohtas Plumeria, Gomti Nagar, Lucknow,

e mail : mail@cespl.in

SPECIFICATIONS FOR GAS SUPPRESSION SYSTEM IN PANELS

NAME OF THE WORK : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA (U.P.)

Architect:

Consultants
Consummate Engineering Services Pvt. Ltd.
B-67, SECTOR – 67, Noida – 201301 Tel. : (0120) 2303500 (24 Lines)
Lko. Office : R 006, Rohtas Plumeria, Gomti Nagar, Lucknow,
e mail : mail@cespl.in

1.0 Scope of Work:

a. Supply, Installation, Testing and Commissioning of clean Agent (Novec 1230/ FK5-1-12 or equivalent) Fire Suppression system designed to provide a uniform concentration within the electrical panels in accordance with NFPA 2001 and requirements of the contract documents).

b. Provide all engineering design and materials for a complete agent suppression system including FK-5-1-12 storage cylinders with steel bracket, extinguishing agent, detection tube, cylinder valve and associated accessories including but not limit to; adaptors, pressure switch, tube fittings etc, required for complete operation of system.

c. All necessary safety requirements such as warning signs, discharge alarm shall be part of system.

d. The necessary nomenclature such as pressurization level, agent volume, gross/net weight of cylinder shall be clearly marked on cylinder.

e. Prior to supply of material at site. Contractor must submit following documents for approval of Engineer-in-charge.

   a) Drawing in A-4 size, clearly showing the panel, routing of tube inside the panel, location and fixing arrangement of cylinder & system components.

f. All doors and holes in the enclosed/equipment's should be closed or sealed to maintain the tightness of enclosure.

2.0 System Description:

a) The detection tube shall be fixed with cylinder valve at top of cylinder. The tube shall be pressurized with dry nitrogen. In case of reach of pre-determined temperature (100-120^{o}C), the tube shall rupture gas shall be released from tube over the protected area.

b) The pressure switch shall be provided for necessary indication of discharge of gas.

c) The Extinguishing Agent shall be stored in cylinder as liquefied compressed gas, super pressurized with dry nitrogen at 15 Bar.

d) The cylinder shall be equipped with brass valve, pressure gauge (to monitor agent pressure) and isolation valve for maintenance purposes. The cylinder bracket shall be of steel construction with quick release clamp.

e) The detection tube shall be installed throughout the compartments of panel. The location and spacing of tube shall be above the hazard, to be protected.

f) In case of fire, the tube shall rupture at a point. The rupture of tube shall result in formation of discharge point and release the agent in uniform pattern.

g) With system activation, a signal should be generated via Audio Visual Alarm installed at convenient location as per Engineer-in-Charge.

h) The system must be service for minimum of 5 years.

3.0 System Components:

The bidder shall provide an under taking from Principle Manufacturer of CE marked product they intent to install, that manufacturer will fully support the bidder for this specific project.

a) Cylinder of steel construction with standard red epoxy paint finish. Cylinders shall be accompanied by original manufacturers test certificate confirming the contents of the cylinder.

b) The cylinders shall be from reputed Manufacturers only. Cylinders shall be super pressurized with dry nitrogen to an operating pressure and temperature as per manufacturer recommendations.

c) Each cylinder shall have pressure gauze and low pressure switch to provide visual and electrical supervision of the cylinder pressure. The low pressure switch shall be wired to the Audio Visual Alarm to provide audible and visual trouble alarm in the event of drop of pressure. The pressure gauze shall be color coded to provide an easy, visual indication of cylinder pressure.

d) Furnish a welded steel bracket with each cylinder assembly for holding the cylinders in a saddle with a front bracket piece that secures the cylinders.

e) Cylinder shall be provided with a certificate provided by the company who charge with the FK-5-1-12 gas mixture. The certificate shall be secured around the cylinder with chain fastener.

f) The Detection Tube, LPCB/UL/CE approved to be Red Colour and pressurized at 15 Bar. The Detection Tube to rupture between (100-120^{o}C).

g) The Pressure Switch should be CE Marked having NO/NC contac

h) The cylinder should be DOT (Department of Transportation) approved as per DOT 4B 240 specifications.

4.0 Extinguishing Agent

FK-5-1-12 (Dedecafluoro-2-Methylpentan-3 One – CF2CF2C (O) CF (CF3)2

(a) The agent shall not contain any Hydroflurocarbons (HFC).

(b) The ozone depletion potential should be zero.

(c) The Global warming potential should be equal to or less than 1.

(d) The Extinguishing Agent should be UL Listed/ FM approved.
(e) The extinguishing agent should be filled in an UL Listed or FM approved filling station.

5.0 Installation

a) The system shall be installed on basis of approved drawing.

b) The installation / final connections shall carry out in direct supervision of representative of Manufacturer/authorized distributors.

c) The installation contractor should be a proven source with minimum 5 years of installation of Trace Tube Systems in India.

d) Cylinder shall be located so that they are not subjected to mechanical, chemical or other damage.

e) All system components shall be capable of withstanding heat of fire and severe weather conditions.

f) Detection Tube to be properly secured inside the panel by Clips/Tie etc.

g) The Detection Tube outside the panel should be protected in flexible conduit.

h) Inspection certificate should be pasted on cylinder clearly marking next due date of inspection.

	SCHEDULE OF QUANTITIES FOR ELECTRICAL INSTALLATIONS				
	PROJECT : "LOGIX BLOSSOM ZEST" AT SECTOR - 143 NOIDA. (FOR TOWER A, B, C, 1 & 2 ONLY)				
	PART (F) - AUTOMATIC FIRE DETECTION GAS SUPPRESSION SYSTEM IN PANELS				
	IMPORTANT NOTE - COMPLETE ELECTRICAL SCHEME TO BE APPROVED FROM UPPCL DEPARTMENT, BEFORE START ANY DESIGNING / FABRICATION.				
S.No	**DESCRIPTION**	**QTY**	**UNIT**	**RATE**	**AMOUNT**
	For Main Common Services LT Panel & Elevator Panels				
	Novec 1230				
1	Supply, fixing, testing and commissioning of Automatic Linear pneumatic Tube Detection based **Novec 1230 (FK5-1-12)** System for Electrical Panels (consisting of the following components).				
	Makes - **FIRETREX, SEVO, SAFEFIRE, ROTAREX**				
a	2.0 KG Novec 1230 (FK5-1-12), DLP Assembly with automatic valve mounted on cylinder, push in connector for tube, 2 Kg Novec 1230 (FK5-1-12) gas, mounting bracket, End of Line adopter and low pressure switch for monitoring system activation. **(Elevator Panels)**	5	No.		
b	4.0 KG Novec 1230 (FK5-1-12), DLP Assembly with automatic valve mounted on cylinder, push in connector for tube, 4 Kg Novec 1230 (FK5-1-12) gas, mounting bracket, End of Line adopter and low pressure switch for monitoring system activation. **(Main Common Services LT Panel)**	2	No.		
c	Linear pneumatic heat Detection Tube with all necessary fittings & supports	250	Mtr		
d	Master Control Unit with Audio Visual Alarm with wiring to make complete system operational. The Control Panel should have provision for integration with Fire Alarm/SCADA/BMS System (Supply to be provide by the end client at 220 Volt AC).	7	No.		
	TOTAL				