

SBU : Greases & Lubricants
P-43, HIDE ROAD EXTENSION
KOLKATA – 700 088

TENDER ENQUIRY

Tender No. : GLK/TE17/243
Date : 30.11.2017
Due date : 21.12.2017 at 15.00 hours [IST]

Sub : Tender for Supply, Installation, Testing & Commissioning (SITC) of 6.0 KV Outdoor type Compact HT breaker(substation)with 1250 KVA Transformer and LT Panel at Grease Plant, Kolkata.

Electronic offers are invited from contractors of repute having strong financial background and meeting pre-qualification criteria for supply of Compact HT breaker with 1250 KVA Transformer as per Specifications & Scope of work, General terms & conditions, and HSE Schedule attached in Annexure - A, B & C respectively.

If the tenderer find any discrepancy, omission, ambiguity or conflict in or among the documents forwarded or be in doubt as to their meaning and interpretations, such matter shall be brought to the attention of us, at least four working days prior to the due date of the Tender. However no change in price/value shall be allowed after placement of the order or during the execution of work at site.

The bidders are requested to kindly check all technical parameters and made a site visit, if required, and acquaint themselves before quoting against the same. For any clarification, please contact

Mr. Rohit Agarwal
Associate Vice President (Operation)

Tel : 033 2450 5430
e-mail id : agrawal.rk@balmerlawrie.com

The bidders are requested to submit their offer on-line before the due date and time of the tender.
Thanking you,

Yours faithfully,
for **Balmer Lawrie & Co. Ltd.**

(Arnab Ghatak)
Sr. Manager (Central Procurement)

Encl.: As above

OBJECTIVES

The purpose of this project is Supply, Installation, Testing & Commissioning (SITC) of 6.0 KV Outdoor type Compact Substation with 1250 KVA Transformer and LT Panel for Balmer Lawrie & Co. G&L, Plant Kolkata.

GENERAL

The Skid mounted substation shall be of fully factory assembled and tested, modular construction housed in a single enclosure consisting of

- a) HT control Panel with one number Load break switch, one number VCB and all other metering and protection
- b) One No 6.0kV/415V Dry type Transformer and
- c) LT distribution Board etc. as detailed in the specification with all protections like over current, earth fault and under voltage etc.

The Substation should be suitable for outdoor application, compact and easily transportable and installation. The Substation shall have minimum maintenance requirement with no accidental access to live parts and fully complied with all statutory requirements.

The Skid mounted substation shall be fully compartmentalized. The Skid mounted substation shall be suitable for bottom cable entry.

The Skid mounted substation shall be Metal clad housing fabricated out of CRCA sheet steel of min. 3mm thick for outer enclosure and 2mm for the rest. Substation shall have suitable mechanical strength for lifting.

All sheet Metal components shall undergo rigorous seven tank process (degreasing de-rusting, phosphating and sealing). Painting shall be of epoxy powder coating to shade RAL 7032 (Siemens Grey). Selection of HT/ LT Board and Transformer components rating shall be as per the enclosed specifications.

Make of Skid Mounted Compact Substation: ABB / Schneider / Siemens / C&S / L&T

SYSTEM REQUIREMENTS

1. System HT : 6.0kV,800A, 350 MVA, 25KA, 3 phase, 3 wire, 50 Hz, Single incoming cum outgoing VCB
2. Transformer : 1250KVA, 6.0KV/415V, Dry type Transformer with OLTC
3. System LT : 415V, 3 phase, 4 wire, 50 Hz, 35MVA System comprising of LV PCC Panel
4. Installation : Outdoor
5. Busbar : Epoxy encapsulated copper busbar shall be provided. Epoxy Seal off bushings shall be used between compartments.

DETAILS OF EQUIPMENTS

TECHNICAL SPECIFICATION FOR HT SYSTEM

1.0 General

- i) The HT switch gear shall be part of compact substation and which in turn is part of supply system of 6.0kV, 3 phase, 50 HZ solidly earthed neutral system.
- ii) The switch gear section shall have single incoming cum outgoing 6.0 KV, 25KA, 800A VCB.
- iii) Specification and other particulars of the switchgear are broadly categorized under the following heads.
 - a) Cubicle with busbars, relay, instruments, earthing device etc.
 - b) Vacuum Circuit breaker.
 - c) Instrument transformer (PTs, CTs)
 - d) Panel lighting

2.0 Cubicle

2.1 Construction

- i) The switch gear shall be one section of the compact substation and all the components of the switch gear section shall be accessible for easy maintenance.
- ii) Sheet steel shall be of minimum 2 mm thickness for partition between sections and 3 mm for hinged front and bolted rear doors.
- iii) Electrical continuity between all metal parts not alive and the earth terminals of the unit shall be ensured.
- iv) Insulated partition shall be provided for Busbars, CTs, PTs, outgoing cables & circuit breaker and relays and controls. Tinned copper busbars with suitable heat shrink sleeves shall be provided. Wire mesh shall be provided wherever necessary to prevent inadvertent touching of busbars.
- v) Hinged doors shall be provided for accessing the switchgear section. Three point locking arrangement with single operating handle shall be provided for all hinged doors. Hinge locks, lock covers etc., shall be fabricated from anti-corrosive material. The hinges shall be sturdy and robust. The doors shall be provided with additional members for strengthening to avoid any warping (or) bending.
- vi) Cubicles will be exposed to high winds, dust and rain. Neoprene gaskets of high quality shall be used. The top cover of kiosk shall have necessary slope to avoid stagnation of rain water.
- vii) Base frame shall be of sufficient thickness and tar painted to give corrosion resistance even if water accumulation is there.
- viii) All mechanical indications of breaker / LBS position, operation shall be visible from outside. Suitable transparent cover shall be provided on the front door of compact unit.
- ix) Emergency push button shall be accessible from outside.
- x) Safety shutters to cover live part to prevent accidental contact, and explosion vents to release the gases during fault occurrences shall be provided.
- xi) Lifting lugs, base frame of adequate thickness, foundation bolts of min.19mm dia with suitable washers shall be provided. Lifting guides shall be provided at the top to prevent touching of wire ropes with body of unit while lifting the compact substation.

2.2 Cable termination:

- i) Both incoming and outgoing cables of the compact Substation are with bottom entry. Cable terminations shall be made with the sealing kits of specified type.
- ii) Blank G.I. plates gasketed and bolted to the cubicle for glanding and terminating control and power cables shall be provided.
- iii) Double compression type brass cable glands shall be used. Tinned heavy duty copper lugs shall be used. Cable shall be secured properly in the compact Substation with suitable support.

2.3 Relays

- i) All relays specified shall be flush mounted in dust proof cases and shall match the appearance of the instruments mounted on the same panel. Each relay shall be identified with relay number indicated in the approved control scheme.
- ii) Protective relays shall be of easy with draw able type. Trip circuits shall be automatically broken and current transformer secondary circuits shorted, when a relay is withdrawn from its case. A marking strip shall be provided in front of each terminal block and diagram plate at the back of each case to identify connections.
- iii) Relay contacts shall withstand repeated operation and shall make or break the maximum currents in their circuit without deteriorating. All spare contacts shall also be wired upto the external terminals.
- iv) Relay coils shall carry their normal currents indefinitely and such currents as can occur under fault conditions. Relay mechanism shall not be affected by vibration or external magnetic fields, which may occur in normal operation.
- v) All relays in tripping circuits shall have mechanically operated flag indicators. Indicators, mechanical or electrical, shall also be provided on other relays to identify type of fault that may have occurred. Indicators shall be capable of being reset without opening the relay case. It shall not be possible to operate the relay by hand or to alter its setting, without opening the case. All relays shall operate satisfactorily from 70 to 110% of rated voltage.

2.4 Indicating Instruments

- i) All indicating instruments shall conform to IS 1248 and integrating meters to IS 722.
- ii) Indicating instruments shall be of size 96 x 96 mm and shall conform to 1.0 accuracy class. Meters shall be suitable to PT secondary of 110V (line) and CT secondary of 5A. Scales shall be suitably provided depending on the ratio of instrument transformer. All indicating instruments shall have non-reflecting bezels, clearly divided and legibly marked scales and sharply outline pointers. They shall be provided with zero adjusting devices for external operation. Indicating instruments shall be taut band type.
- iii) One no. static type, class 0.5 accuracy energy meters shall be provided.

2.5 Control Circuits

- i) Control switches shall be suitable for use in AC circuits up to 440V and rating of 5A.
- ii) All incoming control and power circuits shall be fed through isolating ON/OFF rotary switch and HRC fuses with insulating base and holder. Closing circuit, tripping and control circuit, lamp circuit shall be segregated and protected by independent fuses.

2.6 Control wiring and ferrules

- i) All wiring shall be carried out with 1100 volts grade core wires having multi-strand copper conductor. All control circuit shall be with copper conductor having a minimum cross-sectional area of 1.5 sq.mm per core and CT circuit shall be 2.5 sq.mm copper conductors. The wire shall be insulated with PVC.

- ii) All control wiring shall be terminated using eye type tinned copper lugs on to the stud type terminals. More than two wires shall not be terminated onto a single terminal.
- iii) All holes or tubes for wiring runs shall be bushed and shall have room for reasonable future additions. All cable runs shall clear injurious gases and heat emitted by control gear operation or shall be adequately protected from them.
- iv) Control cables when laid in HT busbar chamber, cable shall be taken through conduits. No joints or tees shall be made in wires between terminals. The wire shall be identified by numbered ferrules at each end, all in accordance with the connection diagram, equipotential terminals shall have the same ferrule numbers.
- v) All ferrules shall be made of non-deteriorating materials. They shall be white except in case of warning ferrules, which shall be red. Ring type ferrules shall have the character engraved on it. The ferrules shall be firmly located in each wire so that they cannot move freely on the wire. Wiring across hinges shall be by flexible wires.
- vi) The colour code for control wiring shall be as enumerated below:
 - a) Metering circuits – Black
 - b) Closing, tripping, protection relays and main power supply circuits – Red.
 - c) Annunciation and indication circuits – White.

2.7 Inscription

- i) Each unit and each component shall be clearly labelled to indicate its purpose.
- ii) Owner's nameplates at front and back of each cubicle shall be engraved on white back ground with black lettering of 10mm size.
- iii) Each component label shall include the component symbol shown on the connection or schematic diagram.
- iv) All components mounted inside the cubicle shall be provided with screwed inscription plate.
- v) The characters to be engraved on the cubicle labels shall be furnished at later stage.

2.8 Earthing

An earth bar adequate cross section shall be fixed preferably at the back of the switchboard. The earth bar shall be electrically continuous and shall run the full extent of each board. The earth bar shall be of same material as the busbars and shall have a minimum cross section of 300 sq.mm. Each unit shall be constructed to ensure satisfactory electrical continuity between all metal parts not intended to be alive and the earth terminals of the unit. Double earthing shall be provided from each equipment to the earth bus by suitable size of wire (or) flat.

2.9 Paintings

The switch gear unit cubicle shall be furnished with colour code to be indicated at the time of drawing approval conforming to IS 5-1961 latest. The sheet metal parts shall be subjected to following pre-treatment before final painting.

- a) Degreasing
- b) Pickling for complete rust removal
- c) Phosphating
- d) Corrosion resistant primer painting. Two final coats spray painting shall be given.
- e) The cubicle shall be painted with colours as follows:-
Internal – Glossy white

2.10 Space heater

Space heater with isolating switch fuse unit shall be provided for each cubicle.

2.11 Testing & commissioning

Routine tests as per relevant IS standards to be conducted at works & site and test certificates shall be furnished. Type test certificates for identical equipment shall be provided.

2.12 Drawing

The following drawings shall be submitted for approval. Copies of approved drawings along with reproducible and soft copies in CDs shall be furnished at the time of supply of equipment. As built drawings incorporating site modifications along with reproducible and soft copies in CDs shall be furnished.

- a) Dimensional GA drawing of switchgear indicating foundation details, cable gland plate location for each cable plan and elevation of switchboard.
- b) Cross sectional drawing of cubicle busbars CTs, cable breaker LV chambers and indicating all electrical clearances between busbars and earth.
- c) Front view of the switchboard indicating arrangement of relays, controls operating heights.
- d) Control schemes of each feeder / breaker with components specification.
- e) Terminal plan and internal wiring drawings of all the cubicles
- f) Inter panel wiring drawings.

3.0 Circuit Breaker

- i) The circuit breaker shall be three pole vacuum circuit breaker with spring charged operating mechanism. Plug in isolating contacts and 4NO+4NC auxiliary contacts all mounted on a withdraw able carriage.
- ii) The air clearance between phases and between phase to earth at the breaker incoming and outgoing terminals shall not be less than those indicated in the IS/IEC/British standards, corresponding to the basic insulation level of the circuit breaker as indicated in the criteria.
- iii) The temperature rise of the breaker contacts / terminals while carrying the rated continuously or the rated short circuit current of rated duration shall not exceed 40 deg C. Over ambient of 50 deg C. Further to minimize burning and pitting of contacts all parts exposed to the arc created by current interruption shall be protected by special arc resistance material.
- iv) The circuit breaker shall be designed such that the peak short circuit current (i.e. 2.5 times the RMS short circuit current) specified can be interrupted without causing appreciable damage to main contacts.
- v) The arc extinguishing chambers and the contact assembly shall be closed in an insulating tube made of FRP/tough glass/ ceramic or other suitable arc resistant material with sufficient strength to withstand the internal pressure / forces developed while clearing rated short circuit current.
- vi) Surge Arrestor shall be provided wherever necessary.
- vii) 110V DC for operation of the Circuit Breaker and protection relays shall be taken from power pack (110V DC). This is to ensure the operation of breaker in case of power supply failure. (2 open and 2 close operations).

3.1. Operating Mechanism

- i) Circuit breakers shall be provided with spring charged, manual & electrical independent closing and shunt trip for opening.
- ii) Trip coil shall operate satisfactory between 70% and 110% of rated voltage.
- iii) The closing and tripping circuits shall be self opening on completion of their respective functions irrespective of position of the breaker ON/OFF switch.

- iv) A readily identifiable mechanical emergency trip device as well as provision for manual charging of springs through the cubicle door shall be provided for each breaker.
- v) In case of circuit breakers with more than one operating spring, they shall be so interlocked such that the springs are charged to the same extent and the breaker can be closed only if all the springs are charged to the required values. Further in case of multiple pole / phase breakers equal current sharing between poles shall be ensured by means of current balance schemes.
- vi) In order to ensure the reliability and long operating life for the mechanism, the mechanism shall be light, with a high mechanical strength and abrasion resistance to avoid high rate of wear and tear and with few components. The number of components in the breaker and operating mechanism shall be kept to a minimum and they shall be designed to be free of undue stresses during normal or short circuit operations. Further they shall ensure a high frequency of operations indicated in technical particulars. All the moving parts of the mechanism requiring inspection, maintenance and lubrication shall be easily accessible.
- vii) Operation counter shall be provided on the breaker for recording number of ON/OFF operations.
- viii) A visual ON/OFF indication and SPRING CHARGED indication shall be provided positively coupled to the operating mechanism and visible from front with the cubicle door closed. Indications shall be provided for limit switches for spring charged and discharged condition. The Mechanism shall be TRIP FREE as per IEC.
- ix) The life of the operating mechanism shall not be less than 30,000 operations.
- x) It shall not be possible to open the doors without opening the Circuit Breaker.

3.2 Auxiliary Contacts

- i) Each circuit breaker shall have 4NO+4NC of auxiliary contacts to control circuit changes for indication, protection, interlocking, supervision, metering and others.
- ii) Breaker auxiliary contacts available in test and service position and those available in service position only shall be clearly indicated.
- iii) Normally open and normally closed contacts shall be interchangeable at site.
- iv) All auxiliary contacts shall be positively operated by the main apparatus and all contacts shall be adequate to make, carry and interrupt the currents in their circuits.

3.3 Emergency push button to trip the VCB shall be provided inside a weatherproof box on the outer side wall of the compact Substation. An Auxiliary terminal box shall house the terminal blocks to receive the following external inputs from

- a) Winding temperature indicator / alarm
- b) 240V, single phase, 50Hz supply for panel and S/S illumination.
- c) Separate terminal blocks shall be provided for control and power.

The auxiliary terminal box shall have IP55 protection on the outer side wall of compact Substation.

4.0 (Deleted)

5.0 Instrument Transformer

5.1 Current Transformer (CT)

- (i) Separate cores shall be used for metering and protection.
- (ii) All current transformers shall be designed to have over current factors to withstand the fault currents of the associated system as applicable to the switchboard.
- (iii) Current transformer used for protection shall an accuracy limit factor not less than 15. Those used for metering shall have a saturation factor of 2.

All current transformers shall have 5 Amp. Secondaries and shall be of resin cast with bar primary. Polarity of primary and secondaries of all the CTs shall be clearly marked.

5.2 Voltage Transformer (PT)

- (i) Voltage transformer shall be built up of CRGO electrical steel. The voltage transformers shall be resin cast dry type. The PTs shall be 3nos. of single – phase type of suitable ratio and burden.
- (ii) HT side and LT side of PTs shall be protected by HRC fuses. LT terminals shall be terminated on separate power terminal block located in the same panel.
- (iii) Control supply 110V AC shall be derived from 6.0KV Bus PT for the following purpose.
 - a) ON,OFF & Auto trip LED Indications for 6.0 KV VCB.
 - b) ON,OFF & Auto trip LED Indications for 0.4 KV ACB.
 - c) Working supply for 4 element relay meant for Transformer protection.
- d) Input source for 110V DC Power pack. 110V DC for operation of the Circuit Breaker and protection relays shall be taken from power pack (110V DC). This is to ensure the operation of breaker in case of power supply failure. (2open and 2 close operations).
- e) PT signal to the static Energy meter (only in the case of 6.6KV entry point kiosks) 6.0 KV Bus PT burden shall be suitably designed to cater the above needs also.

6.0 Selector Switches:

- i) The rating and other features of the switches shall be suitable for the application. The number of positions and the number of contacts required for each switch shall be as indicated in the schemes enclosed.
- ii) Selector switches shall be stay put type, provided with properly designated escutcheon plates clearly marked to show operating position.
- iii) Terminals carrying potential above 120V shall be shrouded to prevent accidental contact with personnel.
- iv) Ammeter selector switches shall have make before break contacts.
- v) The switches shall be suitable for semi-flush mounting with the front plate and operating handle projecting out. All connections to the switches shall be from the back.
- vi) The arrangement for front mounting of these devices shall be such as to make them reasonably dust free so as not to interfere with normal operation.

7.0 Indicating Lamps:

- i) LED type Indication lamps shall be complete with lens covers and holders.
- ii) Each lamp shall be fitted with a durable resistance integrally wired in series within the lamp. Alternatively, lamps with built in transformers are acceptable.
- iii) The lamp cover (lens) shall be translucent of red colour.
- iv) Bulbs and covers shall be interchangeable, easily replaceable from the front without the need for any special means.
- v) Terminals having potential above 120V shall be shrouded to prevent contact with personnel.

8.0 Terminals:

- i) Terminals shall be stud type of copper material.
- ii) Terminals shall be provided with transparent cover(s).
- iii) Separate terminals shall be available for each termination of loop-in and loop-out power connections.
- iv) Terminals shall be suitable for ring type copper cable lugs of size depending upon the circuit rating.

9.0 Labelling:

- i) Labels to identify all the main assemblies, sub-assemblies and components of the Kiosk shall be provided.
- ii) Name and rating plate/markings shall be provided as required by relevant standard applicable to each component/assembly to be identified
- iii) Labels shall be of two colour, three layer plastic material with matt or semi matt finish or of the anodized Aluminium sheet.
- iv) All labels other than “danger” or “warning” labels shall have black lettering on a white background. Danger label shall be as per applicable standard and shall not be fixed on to removable parts.
- v) All labels shall be securely fixed on to the equipment by means of self-tapping screws or other approved means.
- vi) Stick-on type labels of good quality and permanent mounting shall be acceptable for internally mounted components only.

10.0 Surface Treatment:

- i) All metal parts and the surfaces (exterior & interior) of equipment, unless stated otherwise in case of reflectors, shall be degreased by dipping in hot alkaline solution and rubbed with wire brush to remove oil & scale from them & then rinsed in water. Alternatively, they may be shot/sand blasted.
- ii) Parts shall be pickled by dipping in hydrochloric acid tank to remove the rust from the surfaces formed during storage of sheets & then rinsed to remove traces of the acid. The cleaning and pre treatment of all metal parts shall be as per applicable standards.
- iii) All parts shall then be subjected to a coat of red oxide primer paint.
- iv) All inside and outside surfaces of panel shall be spray painted with synthetic enamel of the shade.
- v) The surfaces to be painted shall then be prepared by phosphatising to protect them from further rusting & to create a good bond with the paint. The pre-treatment shall conform to the applicable standard.
- vi) Paint thickness shall be as per applicable standard.
- vii) Electrostatic or powder painting shall be acceptable subject to purchaser’s approval.
- viii) Wherever possible, finished parts shall be coated with peel able compound by spraying method to protect the finished product from scratches, grease, dirt and oily spots during handling and transportation.

11.0 Additional Requirements:

- 1. 1 No emergency trip push button (mechanical).
- 2. Mimic: A single line diagram showing the direction of power flow shall be drawn on the front of load break switch. The mechanical operation of switch shall automatically indicate ON/OFF status of both main switch as well as the earth switch in the mimic diagram.
- 3. 1 set of epoxy encapsulated copper busbar interconnection arrangement for transformer.
- 4. Fluorescent lamps for sufficient illumination shall be provided and for that power supply shall be provided from LT side of Substation.
- 5. DC Fluorescent lamps for emergency lighting shall be provided.

12.0 TECHNICAL REQUIREMENTS

1.0 6.0 KV SWITCHGEAR SECTION

1.1 General

Type : Vacuum, Metal-clad, draw out
Service : Indoor

1.2 System

Voltage : 6000V (+/-) 10%
Phase : 3
Frequency : 50 Hz + 5%
System ground : Non-effectively earthed.

1.3 Rated Current at 50 Deg. C

Busbar : 800A
Circuit Breaker : 800A

1.4 Short Circuit Rating

Interrupting : 25 KA (Sym.)
Short time for 3 secs. : 25 KA

1.5 Insulation Level : 60 / 20 KV (peak / r.m.s.)

1.6 AC/DC Power Supply

Control Voltage : 110V DC (95 - 120V)
Service voltage : 110V AC

2.0 CIRCUIT BREAKER

2.1 Duty cycle : 0-3' - CO - 3' - CO

2.2 Breaking Current

AC Symmetrical : 25 KA at 6.0 KV

2.3 Making Current : 62.5 KA peak at 6.0 KV

2.4 Operation Time

Break time : Not more than 3 cycle.
Make time : Not more than 5 cycle.

2.5 Auxiliary Voltage

Closing : 110V DC (85% - 110%)
Tripping : 110VDAC (70% - 110%)
Spring Charging : 110V AC

2.6 Spring Charging Mechanism : Motor operated type

3.0 CABLE TERMINATION

3.1 Size of incoming & outgoing cable : 3/C x 185 sq. mm (Al.) 11 KV grade (UE) XLPE Cable Type : A2 XWY)

4.0 **Note: In case of power resumption after failure from CESC, VCB will not trip & will auto resume supply.**

Technical Particulars of VCB

SL	Metering for VCB
1	3 nos. Digital Volt meter for each phase
2	3 nos. Digital Amper meter for each phase
3	1 No. TOD meter (MD setting with tripping contact)
4	1 No. PF meter

SL	Protection of VCB
1	IDMT relay 3 O/C, 1 E/F (50, 50N, 51N,51/N)
2	Backup earth fault relay-MC/12(61)
3	Under Voltage relay MC 12-(27)
4	DC fault Supervision Relay-80
5	Over Voltage relay
6	Trip Circuit Supervision Relay VAX 31
7	3-Element Transformer Protection Relay-Trip (VAA33)
8	3-Element Transformer Protection Relay-Alarm (VAA33)
9	Anti pumping relay (VAA11)
10	1 Element Relay Master Trip VAJH13 (86)
11	TOD tripping relay

SL	Indications & Annunciations of VCB
1	Indications-R,Y,B, ON, OFF, Trip, Test, Service, Spring Charge
2	8 Window Annunciator with test, accept, Reset, PB & Hooter
3	T-N-C Switch & Local /Remote S/W
4	Power Pack, 230V AC/110V DC
5	Set of 1P,2P,3P & 4P MCBs & aux. contact multipliers
6	Space Heater with Thermo-state with ON/OFF switch & utility socket.

II DRY TYPE RESIN CAST TRANSFORMER:

1.0 General

The transformer shall be 1250 KVA, 6.0/0.415 KV, 3Ø, two winding, AN, Dyn 11 Transformer suitable for indoor installation with $\pm 5\%$ off circuit tap changer instead of 2.5% as per Technical Specification and IS 2026 with all fittings and accessories enclosed. The transformer is fed from HT switchgear. On the LT side, it is connected to LT switchboard through busbar.

1.1 Transformer Rating and Over loading

- (i) Transformers shall be capable of delivering the rated current at a voltage equal to 105 percent of the rated voltage without exceeding the temperature limits.
- (ii) Transformer shall operate satisfactorily without injurious heating at rated kVA, at any voltage within $\pm 10\%$ of the rated voltage of the particular tap.
- (iii) Transformers shall be designed for 50 Hz. +3%, - 5%, unless otherwise specified in data sheet.
- (iv) Transformers for two or more limits of voltage or frequency or both shall operate satisfactorily at its rated kVA without injurious heating under all the rated conditions of voltage or frequency or both, provided increase in voltage is not accompanied by decrease in frequency.
- (v) Transformers shall be suitable for over loading as per IS 6600, unless specified otherwise. Off circuit tap switch, terminal bushings, other auxiliary components / equipment shall be designed for maximum permissible overloading. Short time over loading to the extent of 50% shall be considered for this purpose, for all transformers unless specified otherwise.

1.2 Short Circuit withstand capability

- i) Transformers shall be capable of withstanding thermal and mechanical stresses during 3 phase, line to line, double line to earth and line to ground dead short circuits at the transformer terminals, for a period specified, without any injury. Temperature of the windings prior to the short circuit to be considered for this shall be that corresponding to the maximum permissible value applicable to the overloading cycle specified.
- ii) For this purpose, infinite supply system and solidly earthed systems shall be considered.

1.3 Flux Density

- i) The maximum flux density in any part of the core and yokes at normal voltage and frequency, shall be such that the flux density under over voltage condition as per clause 1.1. (i) shall not exceed the maximum permissible values for the type of laminations used and core construction adopted.
- iii) In case of transformers with variable flux, the voltage variation, which would affect flux density at every tap, shall be kept in view while designing the transformer.
- iv) Transformers shall be designed to withstand the following overfluxing conditions: 110% of maximum density; Continuous for all transformers corresponding to rated voltage.

1.4 Magnetic circuit

- (i) The cores shall be constructed from high grade, low loss, high permeability cold rolled non-ageing grain oriented silicon steel laminations.
- (ii) Thickness of laminations shall be 0.3 mm or less surface insulation of laminations shall be rust resistant and have high inter laminar resistance. Insulation shall withstand annealing temperature as high as 850 deg.C. The insulation shall be resistant to the action of hot cooling medium.

- (iii) The insulation structure for the core to bolts and core to clamp plates shall be such as to withstand a voltage of 2000V AC for one minute.
- (iv) Wherever the CRGO sheets are punched or sheared into laminations, laminations shall be annealed in a non-oxidising atmosphere to relieve stresses and restore the original magnetic properties of CRGO sheets. The laminations shall be free of all burrs and sharp projections.
- (v) The design of magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself or to the earthed clamping structure and production of flux components at right angles to the plane of the laminations which may cause local heating.
- (vi) Ducts shall be provided where necessary to ensure adequate cooling. The winding structure and major insulation shall not obstruct the free flow of cooling medium through such ducts.
- (vii) All steel sections used for supporting the core shall be shot or sand blasted after fabrication.
- (viii) The finally assembled core and coil assembly shall be rigidly fixed to the tank to avoid shifting during transport, handling and short circuits. Adequate provision shall be made for lifting the complete core and coil assembly.
- (ix) The supporting frame work of the cores shall be so designed as to avoid the presence of pockets which would prevent complete emptying of the tank through the drain valve, or cause trapping of air during filling.

1.5 Windings

- (i) Transformers shall be suitable for solidly earthed neutral system.
- (ii) The coil clamping arrangement and the finished dimensions of any ducts shall be such as to not impede the free circulation of cooling media through the ducts.
- (iii) The windings / and connection of transformer shall be braced to withstand shocks, which may occur during transport or due to short circuits, repeated peak loads and other transient conditions during service.
- (iv) Windings shall be subjected to a shrinkage treatment before final assembly, so that no further shrinkage occurs during service. Adjustable device shall be provided for taking up any possible shrinkage of coils in service if required.
- (v) The conductors shall be transposed at sufficient intervals in order to minimize eddy currents and equalize the distribution of currents and temperature along the windings.
- (vi) Coil clamping rings shall be of steel or of a suitable insulating material. Axially laminated material other than Bakelite paper shall not be used.
- (vii) Completed core and winding assembly shall be dried in full vacuum to eliminate presence of moisture. After drying process, the full assembly shall be impregnated immediately.
- (viii) No strip conductor, wound on edge shall have a width exceeding six times its thickness.
- (ix) The winding material shall be copper
- (x) Windings shall not have sharp bends, which might damage insulation and /or produce high dielectric stresses.
- (xi) Coils shall be supported using dried and high – pressure compressed wedge type insulation spacers at frequent intervals.
- (xii) All threaded connections shall be locked. Leads from the winding to the terminal board and bushings shall be rigidly supported to prevent injury during short circuits / vibration.
- (xiii) Permanent current carrying joints in the windings and leads shall be welded or brazed.
- (xiv) Clamping bolts for current carrying parts inside the transformer shall be compatible with liquid under all service conditions.

1.6 Tappings

- (i) Tapping as specified shall be provided on the higher voltage winding of each transformer and shall be arranged so as to maintain as far as possible the electromagnetic of the windings.
- (ii) The Taps shall be changed by links.

1.7 Temperature Measurement

- i) Winding temperature shall be monitored with RTD's. The RTD leads shall be brought out and connected to temperature scanner.
- ii) Each scanner shall have potential free Normally Open Contacts for alarm and trip contacts. Temperature setting of each contact shall be independently adjustable at site. A manual reset type maximum temperature indicator shall be provided for each scanner.
- iii) All contacts shall be rated to make 0.5 A (min) and break 0.2 A (min) at 110 VAC. All contacts shall be wired to marshalling box.

1.8 Internal earthing arrangements

All metal parts of the transformer with the exception of individual core laminations core bolts and associated individual clamping plates shall be earthed internally.

1.9 Tests

All the transformers shall be subjected to the following routine tests anode transformer shall be type tested at the manufacturer's works. Test procedure as per IS-2026 shall be adopted.

- i) Routine Tests
 - 1. Transformer shall be fully assembled with all fittings and accessories including wheels to ascertain that all the parts fit correctly
 - 2. Resistance of each winding of each phase at principal tap and at all other taps.
 - 3. Voltage ratio at all taps.
 - 4. Checking of voltage vector relationship.
 - 5. Impedance voltage at rated frequency and principal tap, lowest and highest taps.
 - 6. Load loss at rated current.
 - 7. Zero sequence impedance at principal tap, rated frequency.
 - 8. No load loss and no lead current at rated frequency and 100%, 110% of rated voltage on HV side. Test shall be repeated with 415V, 3 Phase supply connected to LV side (if the LV side rated voltage is more than 415V). No Load & Load Losses shall be as per CBIP / IS with tolerance.
 - 9. One minute power frequency withstand voltage test.
 - 10. Induced over voltage withstand test.
 - 11. Polarity check, ratio check, measurement of secondary winding resistance, excitation, characteristic curve, insulation resistance of all bushing CTs.
 - 12. Calibration of winding temperature indicators,
- ii) Type test
 - 13. Temperature rise test.
 - 14. The Contractor shall submit Type Test certificates for similar capacity Transformer supplied by him elsewhere for (i) Short time withstand capability Test and (ii) Impulse Voltage withstand Test. In case Type Test certificates for similar equipment are not available the same will be conducted in the presence of the Purchaser or his Representative if Purchaser so desires without any financial implications to the purchaser.

2.0 Additional Requirements:

1. Fluorescent lamps for sufficient illumination shall be provided and for that power supply shall be provided from LT side of Substation.
2. DC Fluorescent lamps for emergency lighting shall be provided.

3.0 TECHNICAL PARTICULARS OF 6.0 / 0.415 kV Transformer

1. Power supply system in which transformer is to be used.
 - a) Primary side (HV) max. voltage : 12 kV
 - b) System earthing :
 - Primary side (HV) : Solidly earthed
 - Secondary side (LV) : Solidly earthed
2. Max. and min. 3 phase and ground Fault levels
 - Primary side (HV) : 350 MVA
3. Direction of power flow : Bi-directional
4. Transformer application : industrial distribution
5. Transformer type
 - a) indoor / outdoor : Indoor
 - b) Dry type / oil filled : Resin cast, Dry type
 - c) Core type / shell type : Core type
6. Auto wound / Two winding / three winding : two winding
7. Number of phases : Three
8. Rated frequency : 50Hz
9. Rated no load voltage :
 - HV winding : 6.0kV
 - LV winding : 0.415 kV
10. Cooling :
 - a) Cooling medium : Air
 - b) Method of cooling : AN
11. Rated kVA at no load voltage and Principle tap : 500 kVA
12. overloading as per IS 6600 : Required
13. Max. temp. rise at rated kVA and Principle tap
 - a) Top oil by thermometer method : 50 deg C
Over design ambient temp of 50Deg C
 - b) Any winding (HV & LV) by resistance method over design ambient temp. of 50 deg C : 55 deg C

14. Permissible Variations

- a) Percentage impedance voltage at rated current, frequency, principle tap at 75 deg C : 4.5 %
- b) Frequency variation : +3%, -5% of 50 Hz
- c) Voltage variation : +/- 10% of rated voltage

15. Tappings

- a) Off-Circuit / ON load : Off Circuit
- b) Manual / Automatic : Manual, by changing links, by isolating Power
- c) No. of Steps : +5%, +2.5%, +0; -2.5% ; -5%
- d) Percentage variation / step : 2.5 %
- e) Winding in which tappings are required : HV

- 16. Short circuit withstand capability of transformer on any tapping for 3 phase and line to ground faults across LV winding : Not less than 2 secs

17. Insulation

- a) One minute power frequency withstand voltage
 - HV winding : 20 kV RMS
 - LV winding : 2.5kV RMS
- b) 1.2 x 50 micro second impulse withstand voltage level
 - HV winding : 60 kV Peak
- c) Induced over voltage withstand
 - HV winding kV (RMS) : As per IS 2026 Part III
 - LV winding kV (RMS) : - do -

18. Windings insulation category

- a) HV – uniform / non – uniform : Uniform
- b) LVL – uniform / non – uniform : Uniform

19. Winding data

- a) No. of winding : Two
- b) Winding material Copper
- c) Winding connection
 - HV winding : Delta
 - LV winding : Star with neutral brought out fully insulated
- d) Vector groups (HV-LV) : Dyn 11

20 . Core laminations		
Type	:	CRGO
Material	:	Silicon steel
Thickness, mm	:	0.3
21. Diagram required	:	yes
22. Parallel operation	:	Suitable for parallel operation
23. Transformer size & limitation & Construction data:		
i. Type of installation	:	Indoor
ii. Terminal Details	:	HT & LT suitable for Bus bar connection
iii. Fittings and accessories required	:	Lifting lugs, name plate, terminal marking plate, bidirectional rollers, earthing lugs, winding temperature indicator with alarm and Trip
24. Class of Protection	:	IP23

4.0 OTHER DETAILS:

1. Temperature rise: Temperature rise of the transformer above the cooling air temperature when tested at the rated KVA shall not exceed the limit in table 4 of IS11171/1985 reaffirmed in 1991.
2. General: The transformer shall be suitable for continuous run and for all type of loads with high efficiency, the transformer shall conform to IS 2026/1997 IEC 726 & IS 11171 / 1985 reaffirmed in 1991 for dry type transformers as amended up to date. The supplier should give sufficient spacing between various terminals so that it can be properly terminated.
3. RTD'S: RTD's shall be embedded in transformer winding (both primary and secondary side) and the leads shall be brought out. The bidder shall supply Temperature Scanner to read the winding temperature. The temperature scanner shall have provision for generating "winding temperature high" trip signal to Twitch gear. The temperature scanner shall be mounted in such a way that operator has access to monitor the temperature periodically.

III. LT SECTION

1.0 General

LT Cubicle shall consist of following:

- i) 1 No. 415V, 2500 A, 50 KA 3 pole ACB of suitable rating with shunt trip release, auxiliary contacts, manual operated type with in-built overload and short circuit releases (magnetic-thermal releases) along with all associated accessories for incomer to LT Distribution board.
- ii) Necessary Bus bar interconnections for LT panel with secondary terminals of the transformer.
- iii) 3 Nos. indicating lamps (R Y B) with necessary fuses and toggle switches, 1 No. 0-500 V voltmeter with selector switch and ammeter with selector switch of suitable rating with matching CTs along with necessary interconnections with suitable size PVC insulated multistrand copper conductor cable for incomer and outgoing feeders.
- iv) Energy Meter shall be provided.
- v) Outgoing feeders are indicated in the scheme provided.
- vi) The distribution board is intended to provide power supply feeders to various LT distribution Boards and to feed various contractors LT boards as shown in scheme.
- vii) The Board has MCCB as outgoing feeders.
- viii) The Board shall be of metal clad single busbar, fully compartmentalized,
- ix) The incomer and the associated items shall be housed in partitioned panel, whereas the rest of the outgoing feeders shall be neatly distributed and compartmentally modular construction need to be adopted. However, it shall be ensured that sufficient working clearance and adequate space for cabling is provided.
- x) LT Side Instrument Transformers, indicating instruments, control circuits, Control Wiring and ferrules, inscription, shall be as per the specification indicated under HT switchgear.
- xi) The rated continuous current of the equipment and components shall be as given in the schemes. These ratings shall be obtained with the components mounted in their housing as in service without exceeding the permissible temperature rise.
- xii) Defeat interlock shall be provided for the units comprising of switch or moulded case circuit breaker as a means of isolation device, such that it is possible to open the door with device ON. It shall not be possible to close the door till the interlock has been reinstated.
- xiii) LT side shall be fitted with a fluorescent lamp.
- xiv) Bottom of LT Board shall have removable gland plates in two pieces to accommodate minimum 15 runs of LT Armoured cable, size varying from 120 sq. mm to 300 sq. mm

2.0 Busbar and Connections

- i) Busbars shall be made of E91E grade aluminium alloy, Cross section of bus bars selected shall ensure the thermal rating and dynamic stability for the short circuit rating specified.
- ii) High tensile cadmium plated bolts with suitable spring washers shall be used busbar joints.
- iii) Busbars shall be polyester sleeved with heat shrunk insulation. Wire mesh shall be provided wherever necessary to prevent inadvertent touching of bus bars.
- iv) Bus bars shall be supported on non-hygroscopic and non-inflammable insulators of material such as glass reinforced moulded plastic material, epoxy cast resin etc. Separate supports shall be provided for each phase of the bus bars. Insulation level of neutral bus bar shall be same as that of phase bus bars.

- v) Bus bars shall be contained in a separate vermin-proof compartment within the Kiosk and shall have bolted sheet steel covers for providing suitable access.
- vi) Busbar clearances in the air shall be as per applicable standard for 500V, 3 phase system.
- vii) Temperature for bus bars, droppers and connections shall not exceed 90 Deg C for an ambient of 50 Deg C while carrying maximum continuous current.
- viii) The busbar, busbar connections and supports shall have sufficient strength to withstand thermal and electromechanical stresses produced by the specified short circuit level of the system.
- ix) Busbars shall be capable of carrying the short time current. The duration of short-time current shall be 1 sec. For the specified current and duration, there shall be no damage to the equipment.
- x) Main busbars and connections shall be prominently marked and displaced for standard sequence counting from rear to front, top to bottom, or left to right as viewed from the switching device operating mechanism side.
- xi) Busbars and connections shall be provided with colour coded PVC sleeves. All live parts shall be properly shrouded with insulating material.
- xii) Earth busbar shall be provided separately. Material of earth busbar shall be GI.

3.0 LT Circuit Breakers (ACB)

- i) The breaker which is provided in incomer shall be of triple pole, air break and of non-draw out type. All current carrying contacts or the breaker shall be silver plated. The main contacts shall have ample area and contact pressure for carrying the rated current of the circuit breaker. Arc chute shall be provided on each pole and so fitted that it can be easily removed for inspection of the main contacts.
- ii) The breaker shall have independent manual spring charged stored energy mechanism. The operating mechanism shall be trip free and designed to reduce mechanical shocks to a minimum during operation. The operating mechanism shall operate normally even when the circuit breaker is closed on to fault.
- iii) All breakers shall be provided with mechanical trip push button, accessible from outside.
- iv) All mechanism shall be designed to give trouble free service over extended periods and shall not deteriorate with normal usage, require attention more often than every 1000 operations or once a year whichever is earlier. Each breaker shall be equipped with mechanical 'ON' 'OFF' indications visible from the front of the panel.
- v) ACB shall be provided with earth fault, earth leakage and over current protections.
- vi) ACB shall be of triple pole construction arranged for simultaneous three pole manual closing and opening and for automatic tripping at short circuit and overload. Neutral link shall be provided for Kiosks.
- vii) Operating mechanism shall be quick make, quick break and trip free system.
- viii) The ON, OFF & TRIP positions of the ACB shall be clearly indicated so as to be visible to the operator when mounted as in service. Operating handle shall be provided in front of the Kiosk.
- ix) ACB shall be capable of withstanding the thermal stresses caused by overloads and short circuits. The maximum tripping time under short-circuit shall not exceed 20 milli seconds. Rated breaking capacity (rms) at 415 V is 10kA. Rated making current (peak) is 21kA.
- ix) ACB terminals shall be shrouded and designed to receive cable lugs for cable sizes relevant to circuit ratings.

4.0 MODULAR CASE CIRCUIT BREAKERS (MCCB):

- i) Modular case circuit breakers (MCCBs) shall be provided for use in lieu of switch fuse for Kiosk incomer.
- ii) MCCBs shall be of triple pole construction arranged for simultaneous three pole manual closing and opening and for automatic tripping at short circuit and overload. Neutral link shall be provided for Kiosks.
- iii) Operating mechanism shall be quick make, quick break and trip free system.
- iv) The ON, OFF & TRIP positions of the MCCB shall be clearly indicated so as to be visible to the operator when mounted as in service. Operating handle shall be provided on front of the Kiosk.
- v) MCCBs shall be capable of withstanding the thermal stresses caused by overloads and short circuits. The maximum tripping time undershoots circuit shall not exceed 20 milli seconds. Rated breaking capacity (rms) at 415 V is 10kA. Rated making current (peak) is 21kA.
- vi) MCCB terminals shall be shrouded and designed to receive cable lugs for cable sizes relevant to circuit ratings.

5.0 INDICATING METERS:

Shall be same as per HT Switch Gear. Section 2.4; Page 4.

6.0 CURRENT TRANSFORMERS:

Shall be as per HT Switch Gear. Section 5.1; Page 11.

7.0 CABLE GLANDS:

- i) Cable glands of suitable sizes shall be supplied for the following cables.
 - 3 ½ C x 240 sq. mm – 6 Nos.
 - 3 ½ C x 300 sq. mm – 28 Nos.
- ii) Cable glands shall be double compression type of brass material.
- ii) Cable glands shall be Nickel plated.
- iv) Rubber components used in the gland shell of neoprene.
- i) Name/trade name of manufacturer, type no, and applicable range of outer diameter of cable shall be engraved/indelibly printed on the cable gland.

8.0 CABLE LUGS:

- i) Cable lugs of suitable sizes shall be supplied for the following cables.
 - 3 ½ C x 240 sq. mm – 6 sets.
 - 3 ½ C x 300 sq. mm – 28 sets.
- ii) Cable lugs shall be of tinned copper
- iii) Name/trade name and size of lug shall be engraved/indelibly printed on each cable lug.

9.0 Additional Requirements:

1. Fluorescent lamps for sufficient illumination shall be provided and for that power supply shall be provided from LT side of Substation.
2. DC Fluorescent lamps for emergency lighting shall be provided.

10.0 TECHNICAL PARTICULARS OF LT SWITCH BOARD

1.0 LT SWITCH BOARD

- | | | | |
|----|---|---|---|
| a) | Rated voltage and frequency maximum voltage | : | 415 V, 3 –phase , 4- wire , 50 Hz
500 V |
| b) | Continuous current rating at design ambient temperature | : | 2500 A at 50 Deg C with IP52 enclosure with canopy. |
| c) | (i) Type of enclosure as per IS 2147 | : | IP52 with canopy |
| | (ii) Min. thickness of sheet steel | : | 2 mm, 3mm for outer surface |
| d) | Applicable standards | : | IS 2147, 8623 |
| e) | Design ambient temperature | : | 50 Deg C |
| f) | 1 sec. Short time rating of switch board with min. busbars, feeder busbars kA (RMS) | : | 20 kA |
| g) | Dynamic through fault current with complete busbars, kA (Peak) | : | 47 kA |
| h) | Incoming termination of LT Switchboard | : | 2500 A Busduct connection from Dry Type Transformer |
| i) | Incoming termination top/ bottom | : | As per manufacturer’s standard |
| j) | Outgoing feeder cable entry top/bottom | : | Bottom |
| k) | Min. clearances at front and back of switchboard | : | 1.5m/1m |
| l) | Min. clearances in air in mm | | |
| | i. Between phases | : | 25.4 |
| | ii. Between live parts and | : | 19.0 |
| m) | 1 minute PF withstand voltage | : | 2.5 kV |

- n) Bus Bar
- i. Busbar material : E91E grade aluminum
 - ii. Continuous rating at Design ambient temperature
 - (a) Main bus bars : 2500A
 - (b) Bus connections to circuit breakers : As per rated currents of breakers
 - (iii) Temp. rise at rated Continuous current of the bus bars in the bus bar chamber : 40 deg. C over 50 deg. C
 - (iv) Type of bus bar insulators : Resin cast / fibre glass

1.1 Breakers

- (i) Type of breakers : Fixed type air breakers
- (ii) Standards applicable : IS 2516
- (iii) (a) Rated service voltage : 415V, 3 Ph. 50 Hz
- (b) Highest system voltage : 500V, 3 Ph. 50 Hz
- (iv) Rated current at design ambient for breakers : 2500 A
- (v) Symmetrical breaking capacity in kA (RMS)
 - (a) at 415V, 0.25 PF : 20 kA RMS
 - (b) at 440V, 0.25 PF : 20 kA RMS
- (vi) Making capacity kA (peak) : 47 kA peak
- (vii) Capacitor breaking capacity at 440V : As per standard
- (viii) 1 sec. short time rating kA (RMS)
 - (a) With release in any setting : 20 kA RMS
- (ix) Thermal release setting ranges (temp.compensated) : 600-120 A
- (x) (a) Short circuit release range : 2-4/3-6kA
- (b) Short circuit release timer setting range : 0.1 to 0.5 sec. mechanical timer/static trip release

- (xi) Operating mechanism
 - (a) Fixed trip/trip free : Trip free
 - b) Spring assisted /spring : Stored energy mechanism
 - Charged stored energy
 - c) Electrical operation / : Manual
 - Manual operation
- xv) Auxiliary contacts
 - a) Type : Silver plate copper contents
 - b) Number : 6 NO + 6 NC
 - c) Breaking capacity at : 5A
 - 440 V AC

1.2 MCCB

- (i) Type of MCCB : Fixed type air break
- (ii) (a) Rated service voltage : 415V, 3 Ph. 50 Hz
- (b) Highest system voltage : 500V, 3 Ph. 50 Hz
- (iii) Rated current at design : 400A to 1250A (as per scheme)
- ambient
- (iv) Thermal release setting : 80% - 150%
- ranges (temp.compensated)
- (v) (a) Short circuit release : as per standard
- range
- (b) Short circuit release : 0.1 to 0.5 sec. mechanical
- timer setting range : timer/static trip release
- (vi) Operating mechanism : Manual
- Electrical operation /
- Manual operation
- (vii) Auxiliary contacts
 - a) Type : Silver plate copper contents
 - b) Number : 2 NO + 2 NC
 - c) Breaking capacity at : 5A
 - 440 V AC

1.3 Current transformers

- (i) Type : Resin cast / tape wound
- (ii) ratio : 1000 / 5A
- (iii) Accuracy class : 1.0
- (iv) Burden : 15 VA

1.4 METERS AMMETER VOLTMETER

- (i) Type Taut band Taut band
- (ii) Accuracy class 1.0 1.0
- (iii) Size 96 x 96 96 x 96

1.5 Indication lamp

- (i) Type : LED

1.6 Feeder Details

- (i) Incomer feeder

- a) Fixed type 2500 A ACB of specified rating

- Stored energy, spring charged closing mechanism, manually operated

- Series trip direct acting temperature compensated thermal release and magnetic short circuit release with mechanical timer. Independently adjustable settings as specified

- Static trip release as alternative can also be quoted

- Mechanical ON/OFF indication

- (b) 3 CTs, class 1.0, resin cast, ALF-5 for metering with CT ratio as per drawing.

- (c) 96 x 96 mm, taut band, circular scale, ammeter, voltmeter to read phase and line voltages, class 1.5

- (d) 1 Nos. Ammeter with selector switch and 1 No. Voltmeter with selector switch with 'OFF' position to read line currents and voltages.

- (e) 3 Nos. tripped on fault/trip circuit healthy lamp (with push button).

- (f) Auxiliary relays, control circuit protection, space heater, accessories for terminations, HRC fuses etc. as required.

- (ii) Outgoing feeders scope

- (a) 3 nos. outgoing feeder with 1250A ACB, TP, MDO, MP, Siemens: ETU37WT/approved eqv.

- (b) 1 nos. outgoing feeder with 400 A MCCB.

- (c) All outgoing feeders shall have ammeter and On Off indicating lamps

IV. GENERAL REQUIREMENTS

1.0 GUARANTEED PERFORMANCE REQUIREMENTS

- i) The vendor shall guarantee satisfactory performance of the equipment supplied under all conditions and requirement as laid down by this specification.

2.0 TESTING AND COMMISSIONING

- i) Routine tests as per relevant IS standards to be conducted at works and at site. Test certificates shall be provided.
- ii) Type test certificates for identical equipment shall be provided.
- iii) All fittings, fabrications, hard wares etc. as specified shall be inspected and tested in accordance with IS recommendation. Type test certificates from National Test House or from reputed agency shall be considered.
- iv) . The testing shall be done in accordance with the applicable Indian Standards and codes of practice. The following test shall be specifically carried out for all lighting installation.
 - a) Insulation resistance.
 - b) Testing of earth continuity path.
 - c) Polarity test of single phase switches.

3.0 PACKING

The material shall be packed as per manufacturers standard. Packing procedure shall be to the purchasers approval.

4.0 OTHER REQUIREMENTS

- i) Vendor shall submit the following only with offer for evaluation.
 - a) Quality plans (QP).
 - b) Bought out quantity (BOQ).
 - c) Proposed open general arrangement (OGA) of Kiosk.

5.0 DRAWINGS

The following drawings shall be submitted for approval as per agreed schedule.

- a) Dimensional GA drawings of switch board indicating busbar arrangement, foundation details, gland plate location.
- b) Front view of switchboard indicating component locations.
- c) Single line schematic diagram indicating feeder details.
- d) Component specification details
- e) List of inscriptions

- f) Internal wiring diagrams.
- g) Terminal plan and external connection diagram.
- h) Cross sectional drawings cubicle indicating details of busbar chamber, cable chamber, breaker chamber etc.
- i) Operation and maintenance manuals,

6.0 PAINTING

The switch unit cubicle shall be furnished with colour code to be indicated at the time of drawing approval conforming to IS 5-1961 latest. The sheet metal parts shall be subjected to following pre-treatment before final painting.

- a) Degreasing
- b) Pickling for complete rust removal
- c) Phosphating
- d) Corrosion resistant primer painting. Two final coats spray painting shall be given.
- e) The cubicle shall be painted with colours as follows:-
 - f) Internal – Glossy white
 - g) External – dark Grey

LIST OF ACCEPTABLE MAKES OF MATERIAL / COMPONENTS

The following are the acceptable makes of materials & components to be used in the installation

1. VCB : ABB / SIEMENS /Schneider/C&S/L&T
2. HRC FUSES : ABB / SIEMENS /Schneider/C&S/L&T
3. CONTROL SWITCHES :ABB/SIEMENS/Schneider/C&S/L&T/KAYCEE/Approvd. Equivalent
4. PUSH BUTTONS :L&T / Schneider/ABB/SIEMENS/Approved Equivalent
5. INDICATING LAMPS :L&T / Schneider/ABB/SIEMENS/Approved Equivalent
6. TIMERS : EAPL / L&T / PLA / BCH/Approved Equivalent
7. INDICATING METERS : L&T / Schneider
8. TERMINALS :CONNECTWELL / ELMEX / TOSHA
9. MCB's :L&T / Schneider/ABB/SIEMENS/Approved Equivalent
10. MCCB : L&T / Schneider/ABB/SIEMENS/Approved Equivalent
11. PROTECTIVE RELAY :ABB/ L&T / ALSTOM/SCHNEIDER/Siemens
12. Cable : RPG Asian / Polycab / Crystal / Gloster / Universal/Mescab
13. Transformer : Voltamp / CGL / ABB/ Siemens / L&T/
/ Schneider/Kirloskar / Approved Equivalent
14. ACB :Siemens, model ETU37WT/approved equivalent

General Terms & Conditions

1.0 Pre-Qualification Criteria

- a) The bidder should have executed at least one similar contract for Design, Supply and installation of HT breaker with transformer for any reputed processing plant for a value of at least Rs 45 lakhs, within the last five years.

Copy of such Order / Performance Certificate in support of the above should be submitted along with the Bid.

- b) Annual turn-over of the bidder shall be minimum of Rs 60 lakhs, for each year, during last three financial Assessment Years ending 2016-2017.

Copies of balance sheets in support of the above should be submitted along with the Bid.

2.0 Submission of offer

Bidder shall submit their online electronic bid in **TWO** parts within the due date and time of the tender without any deviation of technical specifications. Also send Hard Copy of Technical bid (Annexure 'A') along with all necessary supporting documents, EMD amount and Tender document (**without price**).

Please do not leave any space blank or incomplete and write NA/NIL/Free in such case(s). Each page of the offer (enclosures) has to be acknowledged by the bidder with their acceptance (signature & company stamp). In case of offer, which are not found in line with our guidelines and Terms & Conditions, may subject to rejection. Only the technically Qualified bidders (Technical specifications, scope of work, HSE practice & submission of EMD in line with tender documents) shall be considered for price bid evaluation.

3.0 Basis of selection and Allocation of order qty

The basis of selection of vendors and allocation of order shall be as under.

- a) The price offers of only the technically successful bidders, who also qualify pre-qualification criteria's shall be considered for further evaluation for placement of order.
- b) The on-line closed bids shall be used for grading the bidders. The lowest quoted bidder on net landed basis in the on-line closed bids shall be designated as "L1" and the next lowest quoted bidder as "L2" and so on in the grading system.
- c) Orders will be placed for 100% quantity on L1 vendor (technically accepted & pre-qualified).
- d) The bidders have no right to claim / disclaim or dispute anything during / in this process.

4.0 Earnest Money Deposit (EMD)

An amount of Rs. 30,000 (Rupees thirty thousand only) as EMD is to be submitted alongwith the bid by means of Pay Order / Demand Draft in favour of Balmer Lawrie & Co. Ltd. payable at Kolkata.

The EMD of the successful bidder will be returned after submission of Security Deposit within 15 days from the date of receipt of purchase order failing which the EMD will be forfeited.

EMD of the unsuccessful bidder(s) will be returned to the respective bidders once the tender is finalized and acceptance of order by the successful bidder.

No interest will be payable against this EMD.

Public Sector Undertakings and micro & small scale manufacturing/ service units registered under MSME/ NSIC/ SSI are exempted from payment of EMD. However, they should enclose a copy of their valid registration certificate to make their bid eligible for consideration.

Technical bid received from tenderers' without EMD will not be considered.

5.0 Security Deposit (SD)

The successful bidder upon receipt of order must submit a security deposit of 5% of the basic order value valid till end of supply and successful commissioning of the equipment.

The SD is payable by means of Pay Order / Demand Draft payable at Kolkata and in favour of Balmer Lawrie & Co. Ltd. or in the form of bank guarantee from any Scheduled Bank as per format of BL. No interest will be payable against this SD.

Public Sector Undertakings and registered MSME/ NSIC/ SSI units are exempted from payment of SD.

6.0 Acceptance of offer & Placement of Order

Balmer Lawrie & Co. Ltd. (BL) reserves the right to reject/accept all or any tender(s). A tenderer must have to quote for all the items/heads under supply for this tender. Purchase order will be placed on a single technically & commercially qualified bidder, whose total price of subject tender stands lowest. **Only technically qualified & pre-qualified bids shall be considered for price bid evaluation.**

7.0 Completion period

Time is the essence of the Contract and the job to be completed in time as given below.

- a) Design and Engineering to be submitted by vendor within 6 weeks from the date of receipt of formal Order.

- b) Civil work & necessary installation of relevant equipments shall be started within 4 weeks from the date of receipt of approval by Balmer Lawrie on design and engineering submitted by the vendor.
- c) Supply and site fabrication / erection of plant and equipment of complete system shall be completed within 10 weeks from the date of receipt of approval by Balmer Lawrie on design and engineering submitted by the vendor.
- d) Trial-run, testing and commissioning of the new equipment system within 12 weeks from the date of receipt of approval by Balmer Lawrie on design and engineering submitted by the vendor.

8.0 **After sales service**

Bidder shall furnish the contact details of after sales service facility available in and around Kolkata and has to submit a declaration for the availability of all 'Spare/assembly parts' of the supplied kettle for at least next five years for replacement and / or maintenance.

9.0 **Price schedule**

The price shall be quoted as per online specified format. Vendors are also requested to upload the detail price bid as per attached annexure III in E-portal.

10.0 **Payment terms**

For Supply Portion

- a) 10 % of Basic amount in advance against submission of proforma invoice & Advance Bank Gurantee.
- b) 80 % plus full taxes within 30 days of receipt of materials at site (on pro-rata basis as per approved price / billing schedule)
- c) Remaining 10 % after 18 months from date of last supply, or 12 months from the date of satisfactory trial run and commissioning whichever is earlier. The same may be released on submission of a Performance Bank Guarantee for equivalent amount valid till end of guarantee period + 3 months for claim period.

For Service Portion

- a) 20 % against mobilization of site with manpower, tools and tackles etc.
- b) 80 % plus full applicable taxes after 18 months from date of last supply, or 12 months from the date of satisfactory trial run and commissioning whichever is earlier. The same may be released on submission of a Performance Bank Guarantee for equivalent amount valid till end of guarantee period + 3 months for claim period.

11.0 **Performance Bank Guarantee (PBG)**

PBG may be furnished in lieu of retention money in specified format of BL and shall be valid for the entire guarantee period from the date of successful commissioning of the complete system.

12.0 Guarantee/Warranty Period

12 (twelve) months from the date of successful commissioning or 18 (eighteen) months from the date of last supply, whichever is earlier.

During this guarantee period the performance of the supplied & commissioned item has to be in line with the expected / agreed quality as per tender/PO and if not then vendor has to replace/rectify the same at no extra cost to BL to the satisfaction of BL.

13.0 Validity of offer

The offers shall remain valid for a period of 90 days from the due date of the tender.

14.0 Documentation

The bidders(s) **MUST** submit the following:

- (i) During tender submission (hard copy)
 - (a) GA Drawing with complete technical details & calculation for the proposed system.
- (ii) After placement of order
 - (a) Civil Foundation Drawing for the system.
 - (b) Detail drawing of system with GA and sectional drawing.
 - (c) List of items and quantity with brief specifications and make, wherever applicable.
- (iii) During Commissioning
 - (a) Operation and maintenance manual of the supplied item/system (two sets).
 - (b) All "Test Certificate" of various components.

15.0 Liquidated Damages

In case of failure to deliver the item (of acceptable quality) by the successful vendor, as per the completion period, a pre-determined liquidated damages @ ½ % per week of the basic order value subject to a maximum of 5% of the basic order value shall be deducted from the invoice of the contractor.

16.0 Working days & hours

All work required to be carried at BL's site, shall be done only during working days from Monday to Saturday between 8:30 A.M. and 5:00 P.M.

17.0 **Factory Rule**

The successful bidder has to abide by the BL factory rules and regulations. Only adult and skilled workmen with necessary PPEs shall be allowed to work in BL premises.

18.0 **Jurisdiction**

All disputes are subject to Kolkata jurisdiction.

19.0 **Undertakings and Obligations of Contractor**

19.1 **Care of works**

19.1.1 Proper care shall be taken during transport, erection, commissioning and testing of the equipment to avoid damage to item/equipment and properties and injury to persons.

19.1.2 The supply material shall be dispatched to the site duly packed (as required) with instructions. The material shall be delivered in good condition, necessary scaffolding, lifting tools and tackles to be used for loading, unloading and shifting of heavy equipment and material shall be provided by the contractor.

19.1.3 Contractor shall remove all wreckage, rubbish etc. from site and stack the wastage at the space allotted for the purpose. On completion of the works, the contractor will keep the space clean and fit for occupation to the satisfaction of the company and demolish store, remove all debris, waste and surplus material supplied/created by them. In case the contractor does not maintain good housekeeping, the company has the right to get the work done and debit the cost to the contractor.

19.1.4 All necessary safety measures & PPTs are to be taken care.

19.2 **Insurance**

The contractor shall cover the following insurance till the complete job is handed over.

19.2.1 All workmen/ persons employed by the contractor and subcontractor against accident, injury & death.

19.2.2 All material and entire installation against loss or damage during transit.

19.2.3 Vendor shall comply with all procedural requirements as defined in the insurance policy to ensure that it is alive till the successful execution and handing over of site back to BL.

19.3 **Safety Rules and Guidelines**

19.3.1 Proper safety precautions and measures to be taken care of on the principle of "Safety comes first" during the entire contract period. The contractor shall be bound to bear any claim or compensation for the accidents, injury and death arising out of negligence on their part to

ensure such safety measures including the expenditure for defense legal proceedings.
19.3.2 Care shall be taken to provide and maintain the safety measures and statutory safety rules and act in force by contractor.

19.3.3 All safety requirements depending on the nature of work should be provided to minimize the occurrence of accidents.

19.4 **Statutory rules and regulations**

Please note that this is a contract for work and accordingly all liability pertaining to this contract including those of the people engaged by the contractor solely rests upon the contractor. The contractor should also indemnify the Company against any deviation from the statutory rules and regulations to be observed by the contractor in respect of their people. ESI/PF/Minimum Wages and all other statutory liabilities shall be borne by the contractor.

20.0 **Procedure for Bid Submission**

The bidder shall submit their response through bid submission to the tender on e-Procurement platform at “<https://balmerlawrie.eproc.in>” by following the procedure given below.

20.1 **Registration with e-Procurement platform:**

For registration and online bid submission bidders may contact HELP DESK of M/s C1 India Pvt., Ltd., or they can register themselves online by logging in to the website “<https://balmerlawrie.eproc.in>”

20.2 **Digital Certificate authentication**

The bidder shall authenticate the bid with his Digital Certificate for submitting the bid electronically on e-Procurement platform and the bids not authenticated by digital certificate of the bidder will not be accepted on the e-Procurement platform.

All the bidders who do not have Digital Certificates need to obtain Digital Certificate. You may contact Help Desk of C1 India Pvt Ltd.

M/s C1 India Pvt Ltd.

C 104, Sector - 2, Noida 201 301. You may also get in touch with their representative

Mr. Ritabrata Chakraborty [e-mail id ritabrata.chakrabortv@c1india.com, Cell No. 09748708094 alternately you may contact

Mr. Tirtha Das, e-mail id : tirtha.das@c1india.com , Contact No: +91-9163254290

20.3 Bid Submission Acknowledgement

The user should complete all the processes and steps required for bid submission. The successful bid submission can be ascertained once acknowledgement is given by the system through bid submission number after completing all the processes and steps. Tender Inviting Authority and C1 India Pvt. Ltd. will not be responsible for incomplete bid submission by users. Users may also note that the incomplete bids will not be saved by the system and are not available for the Tender Inviting Authority for processing.

Note :

- a) Vendor has to be certified to ISO 9001 latest version
- b) Vendor to conform to all applicable legal (statutory and regulatory) requirements
- c) Vendor to provide test certificate with each lot.
- d) Bids of any tenderer may be rejected if a conflict of interest between the bidders and Company is detected at any stage.

for Balmer Lawrie & Co. Ltd.

(Arnab Ghatak)

Sr. Manager (Central Procurement)

Annexure C

HSE Chapter

In order to achieve the tender goal in a very smooth & SAFE manner, all the bidders are required to comply with this HSE chapter, before, during and after the tender finalization or related job execution, in following prescribed procedure :

Annexure C 1

Pre-Qualification Questionnaire for Contractor

Guidelines for Completion of Questionnaire

- i. The potential bidder is to ensure that the answers provided are focussed against the activities indicated in the pre-tender document.
- ii. The information is supplied in the same format and sequence in which they appear in the questionnaire. A minimum of 12 has to be obtained in the HSE pre-qualification questionnaire.
- iii. Failure to supply information that accurately and fully covers the material requested may result in an individual Contractor failing to meet minimum expectations and therefore being disqualified.
- iv. Contractor shall provide information that is authentic and documentary evidence.
- v. Even after getting pre-qualified, if it comes to the notice that non-authentic documents are provided, the Contractor may be disqualified and if any Contract is in place, it may be terminated immediately.
- vi. BL shall have right to audit Contractors records to verify the authenticity of the documents, during any phase of the Contract.

Questionnaire for HSE Pre-Qualifications of contractors :

Contractor Details	
Company Name	
Contact Person for HSE :	
Name	
Cell Number	
e-mail address	

	Question	Response		Evidence Required at bidding Stage	Weightage if complied
		Yes	No		
1	Do you have a signed and dated HSE Policy?	<input type="checkbox"/>	<input type="checkbox"/>	Attach HSE Policy	1
2	Do you confirm that you will comply with BL HSE Policy in as much as it is applicable to your scope of work?	<input type="checkbox"/>	<input type="checkbox"/>	None	1
3	Do you have a Health and Safety System certified by an accredited body to a recognized standard? (e.g : OHSAS 18001)	<input type="checkbox"/>	<input type="checkbox"/>	Provide Current Certificate	3

	Question	Response		Evidence Required at bidding Stage	Weightage if complied
		Yes	No		
4	Do you have an Environmental Management System Certified by an accredited body to a recognized standard? (e.g : ISO 14001)	<input type="checkbox"/>	<input type="checkbox"/>	Provide Current Certificate	3
5	Have you identified, documented and maintained your Health and Safety risk assessment of your activities?	<input type="checkbox"/>	<input type="checkbox"/>	None	3
6	Have you identified, documented and maintained your Environmental Impact Assessment of your activities?	<input type="checkbox"/>	<input type="checkbox"/>	None	3
7	If you use subcontractors, will you assess them in terms of HSE?	<input type="checkbox"/>	<input type="checkbox"/>	None	2
8	Have you produced project/contract HSE plans for recently completed work?	<input type="checkbox"/>	<input type="checkbox"/>	None	2
9	Is HSE Covered in your company's organization chart?	<input type="checkbox"/>	<input type="checkbox"/>	Provide Current Org Chart.	2
10	Have HSE roles and responsibilities been defined in your company?	<input type="checkbox"/>	<input type="checkbox"/>	None	2
11	Have your employees received documented HSE training appropriate to the task they will undertake?	<input type="checkbox"/>	<input type="checkbox"/>	None	2
12	Do you identify and monitor compliance with HSE Legislation?	<input type="checkbox"/>	<input type="checkbox"/>	None	2
13	Do you carry out regular medical examination for your employees?	<input type="checkbox"/>	<input type="checkbox"/>	None	1
14	Is your company free from any charges or notices served by the regulatory authorities in relation to HSE in the last 3 years?	<input type="checkbox"/>	<input type="checkbox"/>	None	1
15	Do you have any procedure of reporting HSE Incident and investigation?	<input type="checkbox"/>	<input type="checkbox"/>	None	2

	Please provide your accident data for the current year and the last 2 calendar years Note: this must include the data of any contractors working for your organization.	Current Year	Current Year 1	Current Year 2	Period Average (Three years average)
16	Number of Fatalities				
17	Number of Environmental Incidents reported to Pollution Control Board				
18	Number of accidents with 2 or more days lost time.(LTI)				
19	Man Days Lost				
20	Total Hours Worked				

I confirm that the above information is correct and that further evidence to support this will be provided to BL on request.

Name	Position	Company	Date	Signature

Annexure – C 2

HSE Requirements BY CONTRACTORS

(To be a part of contract document)

1.0 Housekeeping

Contractors shall ensure that their work area is kept clean tidy and free from debris. The work areas must be cleaned on a daily basis. Any disposal of waste shall be done by the Contractor.

All equipment, materials and vehicles shall be stored in an orderly manner. Access to emergency equipment, exits, telephones, safety showers, eye washes, fire extinguishers, pull boxes, fire hoses, etc. shall not be blocked or disturbed.

2.0 Confined Space

Before commencing Work in a confined space the Contractor must obtain from BL a Permit to Work, the Permit to Work will define the requirements to be followed.

As minimum Contractors must ensure the following:

- i. Confined spaces are kept identified and marked by a sign near the entrance(s).
- ii. Adequate ventilation is provided
- iii. Adequate emergency provisions are in place
- iv. Appropriate air monitoring is performed to ensure oxygen is above 20%.
- v. Persons are provided with Confined Space training.
- vi. All necessary equipment and support personnel required to enter a Confined Space is provided.

3.0 Tools, Equipment and Machinery

The Contractor must ensure that all tools & equipment provided for use during the Work is:

- i. suitable for its intended use
- ii. safe for use, maintained in a safe condition and where necessary inspected to ensure this remains the case (any inspection must be carried out by a competent person and records shall be available);
- iii. Used only by people who have received adequate information, instruction and training to use the tool or equipment.
- iv. Provided with Earth leakage circuit breaker (ELCBs) at all times when using electric power cords. Use of electrical tape for temporary repairs is prohibited.

4.0 Working at Height

Any Work undertaken where there is a risk of fall and injury is considered to be working at height.

For any Contractor Personnel working at height, Contractors shall provide fall prevention whenever possible and fall protection only when fall prevention is not practicable. Before commencing Work in a height the Contractor must obtain from BL a Permit to Work, the Permit to Work will define the requirements to be followed. Supervisor must be present at all point of time, to ensure no deviation occur during the course of work.

Fall Prevention System

Fall prevention systems (e.g. fixed guardrails, scaffolds, elevated work platforms) must provide protection for areas with open sides, including exposed floor openings.

Fall Protection Systems

Where fall protection systems are used then the Contractor must ensure the following is applied:

- i. Only approved full body harness and two shock-absorbing lanyards are used,
- ii. Prior establishment of a rescue plan for the immediate rescue of an employee in the event they experience a fall while using the system,
- iii. Anchorage points must be at waist level or higher; and capable of supporting at least the attached weight,
- iv. Lifeline systems must be approved by BL before use.
- v. Use of ISI marked industrial helmet at all point of time.

5.0 Scaffolding

All scaffolds shall subject to a documented inspection by a competent person and clearly marked prior to use. The footings or anchorage for scaffolds shall be sound, rigid and capable of carrying the maximum intended load without settling or displacement. All scaffolding materials should be of MS tubular type.

Guardrails and toe-boards shall be installed on all open sides and ends of scaffold platforms. Scaffolds shall be provided with an access ladder or equivalent safe access. Contractor Personnel shall not climb or work from scaffold handrails, mid-rails or brace members.

6.0 Stairways and Ladders

Ladders should only be used for light duty, short-term work or access in line with the below and the Site Requirements.

- i. Fabricated ladders are prohibited.
- ii. Ladders will be secured to keep them from shifting, slipping, being knocked or blown over.
- iii. Ladders will never be tied to facility services piping, conduits, or ventilation ducting.
- iv. Ladders will be lowered and securely stored at the end of each workday.
- v. Ladders shall be maintained free of oil, grease and other slipping hazards
- vi. Ladders will be visually inspected by a competent person and approved for use before being put into service. Each user shall inspect ladders visually before using.

- vii. Ladders with structural defects shall be tagged "Do Not Use," immediately taken out of service, and removed from the Site by the end of the day.

7.0 Roof Work/Access

Roof work and access to roofs must not be undertaken without prior authorization from BL.

8.0 Overhead Work

A secure exclusion zone shall be maintained by Contractor below overhead work to prevent access. It is forbidden to work beneath a suspended load.

9.0 Lifting Operations

Cranes and Hoisting Equipment

Contractors shall operate and maintain cranes and hoisting equipment in accordance with manufacturers' specifications and legal requirements.

Only Contractor Personnel trained in the use of cranes and hoists are permitted to use them.

10.0 Lifting Equipment and Accessories

All lifting equipment / accessories e.g., slings, chains, webbing, chain blocks, winches, jacks etc shall be indicated with their safe working load have an identification number visible on the unit and be inspected and tested in accordance with legal requirements.

Damaged equipment / accessories and equipment shall be tagged "out of use" and immediately removed from Site.

11.0 Lockout Tag out ("LOTO")

Prior to performing work on machines or equipment, the Contractor shall ensure that it is familiar with LOTO and Permit to Work procedures and that all of its affected Contractor Personnel receive the necessary training.

12.0 Barricades

Floor openings, stairwells, platforms and walkways, and trenching where a person can fall any distance shall be adequately barricaded and where necessary, well lit. Where there is a risk of injury from a fall then rigid barriers must be used.

Barricades must also be used to prevent personnel entering an area where risk of injury is high e.g., during overhead work activity or electrical testing etc. Such barricading must provide clear visual warning.

13.0 Compressed Gas Cylinders

Gas cylinder shall be securely stored and transported, and identified and used in line with the local requirements. Hose lines shall be inspected and tested for leaks in line with local requirements. Flash Back arrestor to be used to prevent any explosion due to back fire.

14.0 Electrical Safety

Prior to undertaking any work on live electrical equipment the Contractor must obtain a Permit to Work from BL. Where ever possible live work should be avoided. Any control measures highlighted shall be implemented prior to work commencing.

The below measures will be taken :

- i. Work practices must protect against direct or indirect body contact by means of tools or materials and be suitable for work conditions and the exposed voltage level.
- ii. Energized panels will be closed after normal working hours and whenever they are unattended. Temporary wiring will be de-energized when not in use.
- iii. Only qualified electrical Contractor Personnel may enter substations and/or transformer and only after being specifically authorized by BL.

15.0 Hot Works

A Permit to Work must be obtained from BL prior to any hot works (welding, grinding, open flame work). Suitable fire extinguishing equipment shall be immediately available. Objects to be welded, cut or heated shall be moved to a designated safe location, or, if they cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place. Personnel working around or below the hot works shall be protected from falling or flying objects.

Prior to the use of temporary propane or resistance heating devices approval must be obtained from BL.

16.0 Trenching, Excavating, Drilling and Concreting

A Permit to Work must be obtained from BL and all underground lines, equipment and electrical cables shall be identified and located prior to beginning the work. The Contractor shall assign a competent Contractor Personnel to all trenching and excavation work.

Safe means of access and egress shall be located in trench excavations. Daily inspections shall be conducted by a competent Contractor Personnel for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems or other hazardous conditions.

Physical barriers shall be placed around or over trenches and excavations. Flashing light barriers shall be provided at night.

17.0 Environmental Requirements

Waste Management

The Contractor is responsible to remove any waste generated by the work being done on the Site. The Contractor must dispose of the waste in line with the relevant local legislative requirements. The waste disposal route shall be documented and made available for BL to review at any time and may be subject to BL's prior approval.

Wastes (includes rinse from washing of equipment, PPE, tools, etc.) are not to be poured into sinks, drains, toilets, or storm sewers, or onto the ground. Solid or liquid wastes that are hazardous or regulated in any way are not to be disposed of in general site waste receptacles.

Spills

The Contractor is responsible for the provision of adequate spill kits/protection and the clean-up and disposal costs arising from such spills.

18.0 Emissions

The Contractor shall identify and quantify any emission sources associated with the Works. The control measures associated with these emission shall be subject to the approval of BL. Emissions include but are not limited to noise, dust, fumes, vapours.

Annexure – C 3

(To be filled after the job completion ONLY - by the job executor)

POST CONTRACT HSE EVALUATION			
	Question	Answer (Yes / No)	Remarks
1	The contractor demonstrated the application of an effective and robust HSE management system.		
2	The contractor did not cause any additional cost or delays to the project through poor HSE performance.		
3	The contractor prepared suitable and sufficient HSE risk assessments and method statements in a capable, proactive and timely manner.		
4	The contractor proactively reported on HSE Events and Deviations.		
5	The contractor's workforce fulfilled their HSE roles and responsibilities.		
6	The contractor's own/subcontracted workforce demonstrated the required level of competency.		
7	The contractor demonstrated knowledge of and proactively ensured compliance with HSE legislation.		
8	All goods/materials/equipment/substances supplied by the contractor were compliant with the HSE requirements.		
9	The contractor ensured that appropriate and timely medical examinations were performed for his own/subcontracted workforce.		
10	The contractor proactively demonstrated housekeeping and cleanliness.		
11	The contractor demonstrated compliance with the Balmer Lawrie Contractors General Terms and Conditions.		
12	The contractor demonstrated control of high risk activities		
13	Number of accidents with 1 or more days lost time		

14	Fatalities during the Contract		
15	Man Day Lost		
16	Man Hours Worked		

Based on the overall HSE performance of the Contractor, the Contractor

1. Can be re deployed for future assignments
2. Needs extensive training & Counseling before reappointing
3. Cannot be considered for future assignments

Sign of the Evaluator/Contract Manager

Sign of the Unit/ Project Head

Annexure – III

Supply, Installation, Testing & Commissioning (SITC) of HT Breaker & Transformer consisting of following as per spec & scope of the tender:

S.NO	Description (ref. tender for detail spec & scope)	Qty.	UNIT	Rate	Amount
1	SITC of OUTDOOR Type 6.0 KV Package Substation consisting of ICOG VCB, 1250 KVA Transformer & LT Panel as specified in tender as per Indian electricity Norms & approvals.	1	SET		
4	SITC of 3CX185 SQMM 11 KV (Unearth), AL. , extruded PVC innersheathed, Armoured HT XLPE Cable.	150	Mtr		
5	SITC 3CX185 11 KV End termination Kit	4	Nos		
6	SITC CABLE 3.5C X 300 SQMM, 1.1 KV AL., extruded PVC innersheathed, Armoured XLPE Cable	1000	Mtr		
7	SITC OF Glanding & termination	34	SET		
8	SITC of miscellaneous tray with steel support separate for HT & LT size as required 7 run LT cable & 1 run HT cable	200	Mtr		
9	SITC EARTHING COPPER PLATE 600X600X3.2 MM Earthing as per IS 3043	8	Set		
10	SITC EARTHING STRIP 50X6 MM HOT DIP GI	200	Mtr		
11	SITC EARTHING STRIP 50X6 MM Copper	20	Mtr		

Civil work:					
12	Earthwork in excavation in all types of soil in foundation, trenches, etc. and site development work up to a depth of 1.5 M from ground level,	30	m3		
13	Supplying and laying in position Brickwork (1st class brick) for Elevation of existing floor level by 1200 mm from road level, Super structure bed size 7 m x 9 m x 0.375 m thk & Cable trench work as required for installation of substation, complete with 16 mm thk plastering on external/exposed surface . Foundation depth of 500 mm is to be considered for the brick wall.	50	m3		
14	Supplying and filling with Pit/ River sand (FM:2.0 to 2.2) and densified to relative density of 90%) hydraulically consolidated, in foundation, in layers not exceeding 200mm in depth including watering, compacting with mechanical compactor	100	m3		
15	Construction of RCC floor with neat cement finishing on the elevated bed with RMC (M30) of average thickness of 150 mm with 10 mm dia TMT bar (Fe500) @ 150 mm c/c on both ways upon brick on edge soling with 1st class bricks.	10	m3		
Other allied work					
16	Liasioning charges for submission of documents, test & report etc and getting the Installation approval from Central Electricity Authority & CESC Ltd.	1	LS		
17	Dismantling & shifting (within plant) the existing HT breaker & Transfer after end terminations including cable (aboveground only).	1	LS		
18	Installation & Commissioning of Equipments (from Sr No 1 to 11)	1	LS		

Price breakup Format

- Vendors are requested to upload Price bid as per above format in e-Portal as ATTACHMENT and put the total figure in the Price Bid on line in two different fields – SUPPLY and SERVICE . No price will be mentioned in the Techno-Commercial bid.
- Please send all documents except Price details in Techno-Commercial bid in sealed envelope so as to reach us before the Due Date of the tender.
- During evaluation, price breakup shall be referred from the uploaded price breakup format in E-portal submitted by the respective bidders.