

e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18

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**BALMER LAWRIE & CO. LTD.**

CONTAINER FREIGHT STATION

*[P-3/1 Transport Depot Road, Kolkata-700088.*

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CIN - L15492WB1924GOI004835

**TENDER NO: BL/CFS/KOL/Electrical Upgradation/17-18  
TECHNICAL / COMMERCIAL BID**

Tender Document for

***Design, Supply, Erection, Testing, Commissioning,  
Modernization & Augmentation of Electrical System in  
CFS kolkata***

**DUE DATE & TIME: [15/12/2017 at 15.00Hrs ]**

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### Background and Objective:

Presently power is fed from CESC at 6 kV and then through a 400 kVA, 6/0.415 kV Transformer for the LT supply. They have a backup GT of rating 250 KVA to feed the critical loads and lighting. A capacitor bank of 125 KVA is also running for Power Factor Improvements. The power distribution system can be represented as per SLD (attached at SLD section of this document, refer Index). The approximate connected load (maximum) presently is **425.25 KVA**. The Single Line Diagram of the existing system is attached in the section Drawings.

To address its current challenges, Balmer Lawrie intends to augment its current electrical infrastructure. The project broadly comprises the following:

- Transformer capacity to be augmented as **1250 kVA** with a new Transformer.
- DG Set capacity to be upgraded to at least 650 kVA. Utilizing the existing unit a new unit of 250kVA, new **400 kVA** DG Set to be installed along with necessary inter-locking arrangement. This is to ensure that in case of failure of CESC supply critical loads can still be served by bringing the DG sets one by one.
- Additional PMCC to cater to the future increase of Load.
- Necessary Power and control cables are to be laid in accordance to the new PMCC
- Given the need for high reliability of the system, "Condition monitoring Solution" has been adopted for critical assets like Transformers and Electrical Panels
- Corresponding addition of yard lighting and office consumption points.
- Training of Balmer Lawrie personnel for the Operation & Maintenance of the proposed assets including the "Condition Monitoring Solutions".

**NOTICE INVITING TENDER**

Bids (**two bid system**) are invited from the reputed and experienced Vendors, who fulfill the eligibility criteria mentioned under General Terms & Conditions covered elsewhere in this document, for undertaking the subject contract for Design, Supply, Erection, Commissioning, modernization & augmentation of Electrical system in CFS Kolkata.

The scanned copies of other required documents in support of their credentials are to be attached along with the tender documents in the appropriate format given below.

S. No	Description	Details
1	Name of Work	Design, Supply, Erection Commissioning, modernization & augmentation of Electrical system in CFS Kolkata.
2	e- Tender No	BL/CFS/KOL/ Electrical Upgradation/17-18
3	Validity Of Offer	120 days from the last date for submission of the bid
4	Completion Period	<b>Fourteen weeks</b>
5	Tender Fee	Rs.5,000.00 (MSME/NSIC are exempted , subject to submission of valid Certificate of Registration)
6	EMD	Rs. 1,00,000.00( Rupees One Lac) (MSME/NSIC are exempted , subject to submission of valid Certificate of Registration)
7	Downloading / Submission of Tender :	
	a. Starts on	<b>18.11.2017</b>
	b. Closes on	<b>15.12.2017 at 15.00 Hrs.</b>
8	Last date of submission of queries	<b>28.11.2017</b>
9	Pre-bid conference	<b>05.12.2017 from 11.00 AM to 12.30 PM</b>

**1. LIST OF DOCUMENTS TO BE UPLOADED**

The scanned copies of following documents should also be uploaded at appropriate link in our e tendering system as part of the technical/commercial bid submission

- a. Power of Attorney authorizing the person who has signed the tender to act and sign on behalf of the company.
- b. Certificate of registration/incorporation in the case of Pvt Ltd/Public Ltd companies/certified copy of /partnership deed in the case of LPP/Partnership firm/ any document under the relevant rules/laws if the firm is a proprietorship firm
- c. Income Tax PAN number
- d. GST Registration number
- e. Chartered accountant's certificate or Audited / Certified Balance sheet and Profit and Loss account of tenderer's company for last two years
- f. Certificate from bankers about financial soundness/ Submission of Certificate from Commercial Bank certifying credit facility for more than Rs.50 Lacs/ Average bank balance not less than Rs.50 Lacs in last two years.

**2. VERIFICATION OF DOCUMENTS**

- a. Tenderers or their authorized representative will be required to come to our office **POSITIVELY** as intimated along with all original documents, scanned copies of which have been submitted with the e-tender towards their qualification.
- b. Failure on part of the tenderer to report on specified date and time for paper verification may result in rejection of the tender submitted by them without further communication.
- c. Tenderer should be in a position to produce all the original documents and/or any other information on dates as intimated or as and when required by BalmerLawrie.
- d. Incomplete Tenders are liable for rejection without any further communication to the tenderer and decision of BalmerLawrie in this respect will be final.
- e. Any party submitting the false or forged documents may be Black Listed, EMD could be forfeited , work could be cancelled , criminal prosecution or any other action as deemed fit may be initiated
- f. BalmerLawrie reserves the right to reject any or all tenders without assigning any reasons Whatsoever.

**SPECIAL INSTRUCTIONS TO THE BIDDER FOR PARTICIPATING IN E-TENDER**

Tenderers are advised to download Notice Inviting Tender along with other tender documents from the e-tendering portal <https://balmerlawrie.eproc.in> Interested parties have to submit an interest free **EMD of Rs.1,00,000/- (Rupees One Lac only)] & Tender fee of Rs.5,000/- (Rupees Five Thousand only)** by Demand Draft/Pay Order at our above address. The DD/PO for Tender Fee and EMD should be drawn in favour of BALMER LAWRIE & CO LTD on any Scheduled Bank, payable at Kolkata. Copies of the instruments (DD/PO) evidencing payment of Tender Fee and EMD should be scanned & uploaded before bidding. The physical original instruments/drafts should reach our above address prior to due date and time. In case the Bidders intend to submit any additional supporting documents, the same can be submitted in physical form at our above address. Documents of only those bidders shall be entertained who are bidding on-line. UNDER NO CIRCUMSTANCES PRICE BID SHALL BE SUBMITTED IN PHYSICAL FORM.

BalmerLawrie & Co. Ltd. has developed a secured and user friendly system which enables Vendors/ Bidders to Search, View, Download tenders directly and also, enables them to participate & submit Online Bids on the e-tendering site <https://balmerlawrie.eproc.in> in a secure and transparent manner which maintains confidentiality and security throughout the tender evaluation process.

**1. Procedure to submit On-line Bids**

For this purpose, Vendors/Bidders are advised to read the instructions available in the homepage of the portal <https://balmerlawrie.eproc.in> where detailed procedure for submission of bids is available under the option / link "*Bidding Manual*".

**1.1 Registration with e-procurement platform**

For registration and online bid submission bidders may contact HELP DESK of C1India Pvt., Ltd. details of which is available at our web-site mentioned above or they can register themselves online by logging in to the website through <https://balmerlawrie.eproc.in>

You may contact the following resource persons for any assistance required in this regard.

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**HELPDESK NOS ARE OPEN BETWEEN 1000 HRS to 1830 HRS IST**  
(MONDAY TO FRIDAY (Exclusions: Balmer Lawrie HOLIDAYS))

**OFF HOURS & HOLIDAY SUPPORT**  
Helpdesk Team would be reachable in their mobiles during off hours and on holidays. Please refer contact us for resource-wise mobile nos.

**Please email your issues before your call helpdesk. This will help us serving you better.**

**Contact Nos. and email IDs for Balmer Lawrie helpdesk officers**

<b>Balmer Lawrie &amp; Co LTD. , 21, Netaji Subhas Road, Kolkata-700 001</b>			
<b>Balmer Lawrie e-Tendering Support Staff:</b>			
<b><u>Nodal officer [For Escalation]:</u></b>  <b>C1 India</b>  Mr. Ritabrata Chakraborty (PM), Contact Details:+91 8697910411, E-mail- <a href="mailto:ritabrata[chakraborty@]c1india[dot]com">ritabrata[chakraborty@]c1india[dot]com</a>	<b>Name</b>	<b>E-mails</b>	<b>Phone Numbers</b>
	1. Mr. Tuhin Ghosh	<a href="mailto:tuhin[dot]ghosh[at]c1india[dot]com">tuhin[dot]ghosh[at]c1india[dot]com</a>	+91-8981165071
	2. Mr. Tirtha Das	<a href="mailto:tirtha[dot]das[at]c1india[dot]com">tirtha[dot]das[at]c1india[dot]com</a>	+91-9163254290
	3. Mr. Ravi Gaiwal	<a href="mailto:ravi[dot]gaiwal[at]c1india[dot]com">ravi[dot]gaiwal[at]c1india[dot]com</a>	+91-022-66865633
	4. Mr. Ujjal Mitra	<a href="mailto:ujjal[dot]mitra[at]c1india[dot]com">ujjal[dot]mitra[at]c1india[dot]com</a>	+91-8986678058

## 1.2 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. They may contact help desk of C1 India Pvt. Ltd.

## 2. Special Note

- Bids can only be submitted before the last date and time of submission as per the date and time mentioned in the e-tender. Resubmission (if required) of bid should be completed within the stipulated date and time. The system time (IST) that will be displayed on e-tendering web page shall be the time and no other time shall be taken into cognizance.
- Bidders are advised in their own interest to ensure that bids are uploaded and submitted successfully in e-tendering system well before the closing date and time of bid.
- No Printed or posted Bids / offers shall be accepted.
- BalmerLawrie does not take any responsibility in case bidder fails to upload the documents within specified time of tender submission.

- BalmerLawrie will not be responsible for any delay under any circumstances for non-receipt of Tenders/ submission of filled in tender documents by due date & time.
- Bidders are requested to provide correct "e-Mail address" and "Mobile No." for receiving updates related to e-tender from time to time.
- The bidder has to keep track of any changes by viewing the Addendum/Corrigendum issued by the Tender Inviting Authority on time-to-time basis in the e-Procurement platform. The Company calling for tenders shall not be responsible for any claims/problems arising out of this. Only at the time of inviting offers, there will be paper ad. There will no further paper ad on this

### **3. Filling of Tender Documents**

- 3.1 The tenderers are requested to carefully study all the tender documents and tender conditions before quoting their rates.
- 3.2 The tender must be strictly in accordance with the terms and conditions and specifications laid out in the tender.
- 3.3 Any terms and conditions given by the tenderer in their offers will not be binding on BalmerLawrie.
- 3.4 The sole proprietor or authorised representative shall sign all documents that needs to be uploaded. When the person signing the documents is not the sole proprietor / authorised representative of the company, the Power of Attorney authorizing such person to act and sign on behalf of the company must be scanned and uploaded and produced later on for verification by Balmer Lawrie.

## **NOMENCLATURE/DEFINITIONS**

### **1.0 GENERAL**

The following expressions hereunder and elsewhere in the contract documents used shall have the following meanings hereunder respectively assigned to them except where the context otherwise requires:

- 1.1 "Tenderers" or "Bidders" shall mean such parties who have been issued Tender Document by the Owner or who have down loaded the tender document and those parties who have submitted these offers to the Owner in response to the Tender Document issued to them.
- 1.2 The "Contractor / Successful tenderer" shall mean the tenderer selected by the Owner for the performance of the work and shall include the successors and Owner permitted assigns of the Contractor.
- 1.3 The "Sub-contractor" shall mean any person or firm or company (other than the Contractor) to whom any part of work has been entrusted by the Contractor with the written consent of the Engineer-In-Charge, and the legal representatives, Successors and permit

1.4 "Site" shall mean all such land, waters and other places on, under, in or through which the works for the Project are to be performed under the Contract.

1.5 "Running Account Bill" shall mean a Bill for the payment of "On Account" to the Contractor.

### **SCOPE OF WORK**

The Scope of Work involves upgrading the existing infrastructure of Electrical Power System at CFS-Kolkata without any power disruption to the existing facilities. Work covered in this tender document shall generally be as detailed herein below. However, contractor shall be responsible to complete the work in all respects and in doing so provide/supply all facilities which may not be covered explicitly herein below but nevertheless are required to complete the work envisaged with the exception of only such items as have been specifically excluded from contractor's scope.

The successful tenderer shall have to undertake the following work:

The various activities under the scope of work shall be, among other related aspects cover the following:

- ❖ Supply, erection, Installation & Commissioning of Distribution System including Distribution Transformer, Consumer HT Panel, LT Panel, DG set, HT & LT Cables, new equipment earthing system as per standard. Quantities are described in the BOQ(Price Bid).
- ❖ Supply, installation, commissioning of integrated Condition Monitoring System of LT Panels and HT Cables.
- ❖ Dismantling of existing panels along with assembly of the new ones as mentioned above.
- ❖ All associated civil works for the foundation of the equipments shall be under the scope of the bidder. The bidder shall provide price of all Electrical & Civil works separately as per the format given in the BOQ (Price Bid) described in this tender document later.
  
- ❖ Site Unloading, storage & handling of all materials supplied including watch & ward for safe custody.
- ❖ Site fabrication work as per requirement.
- ❖ Obtaining clearance from statutory Agencies, Government Departments etc wherever necessary.
- ❖ Submission of technical specifications/drawings/test certificates etc of all materials supplied.
- ❖ Project Management & Site Supervision

### **Safety Clause**

- A. a) The contractor and his workers must strictly take all safety precautions and shall supply to his workers dependable safety appliances like hand gloves, safety boots, safety belt, safety helmets, duster cloth, dust mask/nostril filter etc. In addition to this, contractor shall also provide additional safety appliances as per requirement and follow safe working practices like using fully insulated electrode holders etc. He shall also ensure that his workmen intelligently use only dependable safety appliances supplied to them.
- b) The contractor shall take adequate safety precaution to prevent accidents at site. The contractor shall also ensure that his employees observe the statutory safety rules and regulations and also those laid down by the employer from time to time and promptly submit report of accident and state the measures taken by him to prevent their recurrence and also keep the employer indemnified of all claims arising out of such accidents.

c) No Workmen shall be engaged on the work without proper safety induction and without using required



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PPE. Use of safety helmet and shoe is must excepting in painting works where shoe will not be used.

d) All workmen employed within Balmer Lawrie site should be in sound and intoxicated health condition. Balmer Lawrie may ask for a health certificate of any workmen employed by Contractor at site anytime before/during/after execution of job at site.

**List of safety violations and penalty clause for the same**

**B. The list of safety violations have been classified in the following categories :**

Category	Details of Violation
Minor	Annexure-1
Subsequent-Minor	Annexure-1
Major	Annexure-2
Subsequent-Major	Annexure-2
Fatal / Permanent disability	High risk violations / Lapses leading to Fatality / Permanent disability

1. The safety standards & rules are to be strictly adhered to. Any non adherence to the Safety stipulations will be termed as violation.
2. Annexure – 1 & 2 are enclosed herewith.
3. Some of the common violations as given in Annexure-1 and Annexure-2 are illustrative and non exhaustive. However, BL executive may identify job specific instructions on case to case basis and non adherence to such instructions will be treated as violation.
4. Decision of BL for any fine/penalty shall be final and binding to the Contractor in this regard.

**C. The penal actions for different types of violations will be as under :**

Category	Description of violation	Penalty per violation
Minor	As listed in Annexure-1	Rs.500/-
Subsequent-Minor	As listed in Annexure-1	Rs.1000/-
Major	As listed in Annexure-2	Rs.5000/-
Subsequent-Major	As listed in Annexure-2	Rs.10,000/-

Fatal / Permanent disability	High risk violations / Lapses leading to Fatality / Permanent disability	*Rs.1,00,000/- or 10% of contract value whichever is lower.  ** Enquiry to be conducted & further action to be taken as per recommendations of the Committee
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**MODE OF DEDUCTION OF PENALTY**

1. In case of Minor violation and every subsequent violation a sum of Rs.500/- and Rs.1000/- respectively (Limited to 10% of contract value) will be deducted from the bill of the contractor as penalty on the direction of Executing Authority to the Finance Deptt for deduction from the bill/Security Deposit of the contractor & Safety Officer/Unit HR Head will be intimated.
2. In case of major violation a sum of Rs.5000/- for 1<sup>st</sup> violation & Rs.10,000/- for every subsequent violation (Limited to 10% of contract value) will be imposed by Executing Authority to the within 3 days of violation and direct Finance Deptt for deduction from the bill/Security Deposit of the contractor accordingly & Safety Officer/ Unit HR Head will be intimated.

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In case of permanent disability, the Unit Head will impose fine of Rs.1,00,000/2,00,000 (Depending on the case) or 10% of the contract value whichever is lower on the contractor. To be imposed upon recommendation of Safety Committee and direct to Finance Deptt for deduction from the bill/Security Deposit of the contractor accordingly.

**ANNEXURE - 1**

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**MINOR VIOLATIONS**

1. Unauthorized entry in hazardous location.
2. Proper ladder/steps not provided for Ascending/descending
3. Shuttering not done (below 2 mtr. Level) of excavation
4. Over handing burden in pit not removed in excavation
5. Power cable clamed with G.I. wires to post/pillar
6. Power cable tied on reinforce rod/structure without proper insulation
7. Loose connection taken from board without board plug
8. Fitness certificate of cranes/hydramac/heavy vehicles not available
9. Rolling/lifting of cylinder/dragging on the ground (without cage);
10. Crane rope condition not ok
11. Rope of crane not clamped properly
12. Not wearing safety helmet/ Reflector jacket at site
13. Working in slippers/barefoot
14. Hand gloves not used
15. Gas cutting without goggle
16. Welding with non-standard holder
17. Welding machine earthing (double body earthing) not done;
18. Welder/ Gas cutter must wear cotton/ leather clothing. No nylon/synthetic dress allowed.
19. LPG Cylinder date expiry/over
20. Gas hose pipe clamping done by wires;
21. Loading/unloading of cylinder-cushion not given
22. Condition of hose pipe not good
23. Working with leaking cylinder
24. Using non power cable instead of welding cable
25. Not putting road block/ red flags /stopper
26. Working without work permit/shut down;
27. Taking shelter behind Electrical panel
28. Not having proper gate passes /other area passes
29. Use of damaged slings/tools/ropes
30. Hand grinders/mixer machines without guard
31. No indicator light/brake light on vehicles;
32. Truck side pane/broken not ok
33. Dropping/Spillage of material on the road
34. Over speeding )violation of speed limits)
35. No indicator light/brake light on vehicles.
36. Talking with cell-phone while driving;
37. Truck carrying powdery material without Tarpaulin;
38. Stock protruding out of the truck body; ;

**MAJOR VIOLATIONS**

1. Using bamboo/or other non standard material for scaffolding.
2. "Permit to work" not obtained for Hazardous jobs.
3. Scaffolding planks not tied properly
4. Throwing/dropping of material from height;
5. Working at Height without Height pass
6. Non Use of Full Body Harness for work at Height (Roof sheet changing, Painting, Maintenance jobs etc)
7. Absence of supervisor at work in Hazardous Area, Confined space & Height working
8. Unguarded floor opening/ barricading excavation pits.
9. No top cover in power distribution board.
10. Railings not provided on working platforms
11. Non anchorage of life line (Lanyard)
12. Welding screen/Face shield, welder gloves not used;
13. Dismantling of structure without authorized plan
14. Driving vehicles without valid driving licence;
15. Driving in intoxicated condition

**TOOLS, EQUIPMENT AND MACHINERY**

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

- Suitable for its intended use;
- Safe for use, maintained in a safe condition and where necessary inspected to ensure this remains the case
- Used only by people who have received adequate information, instruction and training to use the tool or equipment.
- Provided with Earth leakage circuit breaker (ELCBs) at all times when using electric power cords. Use of electrical tape for temporary repairs is prohibited.

**GENERAL TERMS & CONDITIONS**

**1. Pre-Qualification Criteria**

- a) Submission of Tender Fee of Rs.5,000.00 (MSME/NSIC vendors are exempted , subject to submission of their valid Registration Certificate ).
- b) Submission of EMD of Rs. 1,00,000.00( Rupees One Lac),(MSME/NSIC are exempted , subject to submission of their valid Registration Certificate )
- c) Bidder must submit Manufacturer's Authorization Certificate for major equipment like Transformer, HT Panel, DG Set, and Condition Monitoring Equipment.
- i) Bidding organization themselves or along with a technical/commercial partner constituting a consortium must meet the Pre-qualification criteria. In case of a consortium bidding, one of the consortium partners has to be the lead bidder which shall be declared by the consortium. All correspondence, obligation to be met shall be the responsibly of the lead organization
- ii) Bidder organization alone or along with the Consortium Partner shall have an average turnover of at least Rs.2.0 Crore for the last three financial years.
- d) Bidder organization alone or along with the Consortium Partner must have executed at least one of the following similar electrical project works in last 7 years :-
- i. Three projects each worth of Rs.70 Lacs.
- ii. Two projects each worth of Rs.90 Lacs .
- iii. One project worth of Rs.140 Lacs.
- e) The Bidder must attend the Pre-Bid conference scheduled on **05.12.2017**
- f) The Bidder must have GST, ESI and PF registration (Proof to be attached/uploaded)
- g) Must have an office set up within 50 Km from the city of Kolkata to ensure better service.
- h) Should not have been blacklisted by any PSU /Govt. Department (a self-certification is required)

Documentary evidence has to be submitted along with Techno-Commercial bid &/ or uploaded at eproc portal of the bid.

**2. SUBMISSION OF ONLINE BIDS**

The bids should be submitted in 2[two] separate parts entitled as

- [A] Technical / Commercial Bid [Un-priced]  
and  
[B] Price Bid

For Price Bid, only the rates are to be submitted as per given format.

The entire bid is to have digital signature of the person having Power of Attorney/Power of Authority to sign on behalf of the Bidder.

### 3. TENDER OPENING

[A] Unpriced [Technical-Commercial] Bid Opening

Technical / Commercial Bids will be opened online as per the Tender Calendar.

[B] Price Bid Opening

After opening and processing of the Technical /Commercial Bids, price bid will be opened.

### 4. ACCEPTANCE OF OFFERS

4.1 BalmerLawrie reserves the right to accept any tender in whole or in part or reject any tender or all tenders or place order for any quantity, less than or more than the tendered quantity, without assigning any reason thereof.

4.2 Bids of any tenderer may be rejected if a conflict of interest is detected between the bidders and BalmerLawrie at any stage.

4.3 BalmerLawrie is not bound to accept the lowest rate for any tender. Balmer Lawrie also reserves its right to allow Public Enterprises (Central / State) price / purchase / contract / service preference as admissible under the existing Government policy. The decision of Balmer Lawrie in this connection will be final.

4.4 Incomplete tenders, conditional tenders, tenders received late or tender not conforming to the terms and conditions mentioned in the Tender documents or not accompanied by the requisite Earnest Money Deposit will be rejected.

4.5 Bids from the tenderer of same business will not be considered to avoid the conflict of interest.

4.6 Evaluation of tender will be done considering the overall cost quoted for the work and not on item to item basis.

### 5. NEGOTIATIONS

5.1 Balmer Lawrie reserves the right to negotiate with the Tenderer. Tenderer will have to attend the concerned office of Balmer Lawrie for negotiations/clarifications required from them, in respect of their quotations, without any commitment on the part of Balmer Lawrie.

5.2 In case of negotiation, the Tenderer should send the confirmation of outcome of such negotiation in writing so as to reach the concerned office of Balmer Lawrie within 3 days from the date of negotiation/ the time stipulated whichever is earlier. If the Tenderer fails to comply with this requirement Balmer Lawrie reserves its right to ignore their quotation at its discretion and proceed to finalise the tender.

### 6. PRE- BID MEETING

On downloading the tender document the intending bidder is requested to review the document and send all queries in written form to any one of the contact persons mentioned below within

10 days of hosting the tender and the Pre-Bid meeting shall be organized in next 7 days (5<sup>th</sup> December 2017 from 11.00 AM to 12.30 PM). As this is a specialized work, attending the pre-bid

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meeting is mandatory. Contractor must ensure that they attend the pre-bid meeting positively. Prospective & willing vendors are required to contact any of the following persons for intimation of the date of Pre-bid meeting.

[1] Mr. Abhrajit Sett, Dy.Manager : 033-24506811, sett.a@balmerlawrie.com

[2] Mr. Gautam Paul, Sr.Manager : 033-24506816 , paul.g@balmerlawrie.com

**7. SITE VISIT**

Bidders are required to make a visit to the site for proper understanding of the physical site conditions and requirements of the work well before quoting against the tender.

**8. PRICE VARIATION**

- a) The price should be firm and irrevocable and not subject to any change whatsoever even due to increase in cost of materials, components and labour cost till the validity of the contract period.
- b) The quoted rates shall be kept valid for acceptance for a minimum period of 120 days from the last date for submission of tender.

**9. NOTIFICATION OF AWARD**

Prior to the expiration of the period of Bid validity, BL will place purchase/work order or letter of intent on the successful bidder.

**10. VALIDITY OF OFFER**

The offer should be kept valid for acceptance by Balmer Lawrie for a period of 120 days from the last date for submission of tender. In case the bidder unilaterally revokes or cancels or varies any rate, terms & conditions of the tender after submission and during the validity period, their Earnest Money Deposit (EMD) shall be forfeited.

**11. COMPLETION PERIOD**

Delivery of materials to be completed within 10-12 weeks from the date of Purchase Order. Installation and commissioning to be completed in another 2-4 weeks.

**12. EARNEST MONEY DEPOSIT**

The bidder shall be required to submit an Earnest Money Deposit of **Rs 1,00,000/- (Rupees One Lac Only)** by way of Bank Draft/BG in favour of Balmer Lawrie & Co. Ltd, payable at Kolkata, drawn on any Scheduled Bank in India. The EMD shall be returned to unsuccessful bidder after finalisation of tender. For successful bidder, the EMD shall be converted into part of Security Deposit (SD) and the same shall be released after successful completion of work only. However, in case successful vendor is MSME/NSIC, they had to submit the requisite SD as mentioned below in the form of DD/BG within 15 days of our awarding the contract.

If the successful bidder is unable to accept or execute orders when placed upon him or fails to execute the job or withdraws or revises his quoted prices within the validity period of his tender/contract after placement of the order/letter of acceptance, their EMD/SD shall be forfeited.

**13. SECURITY DEPOSIT**

A non-interest bearing Security Deposit of Rupees Five Lacs **[Rs.5,00,000/-]** by way of Bank Draft or Bank Guarantee will be required to be deposited with the Company by the successful bidder within 15 days of getting work order from the Company. EMD may be adjusted with Security deposit. The same

shall be released along with final bill payment on satisfactory performance of all the obligations under this Contract including completion of work in all respects.

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As and by way of additional security, from every progress bill of Contractor, Security Deposit in the form of Retention Money at the rate of **10%** of the Gross value of such bill as determined before payment shall be retained by the Owner or the payment also can be released on submission of Bank Guarantee of

Equivalent amount during the progress of work. Owner can permit Contractor to replace the Retention Money so retained by separate Bank Guarantee after successful completion of the work valid for defect liability period.

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The Security Deposit / Retention Money shall remain at the entire disposal of Owner as a security for satisfactory execution and completion of the Work(s). Owner shall be at liberty to deduct and appropriate from the Security Deposit / Retention Money such damages (liquidated or otherwise) and other dues and recoveries from Contractor under this Contract and the amount by which Security Deposit / Retention Money is reduced by such appropriations, will be made by further deductions from Contractor's subsequent bills to that extent as to make up the Security Deposit / Retention Money.

**14. QUANTITY VARIATION:**

There may be quantity variation/ addition/deletion for different items except for major equipments like Transformer, GD Set, HT Breaker , subject to the condition that the total value of the contract does not increase or decrease by more than 15% keeping the unit rate of the material & labor unchanged.

**16. ON ACCOUNT PAYMENTS**

On Account payments will be made to the Contractor during the progress of the work on the basis of Running Account Bills raised by the Contractor monthly or otherwise as the Engineer-In-Charge may specify in this regard

- a) 80% of Purchase Order value shall be paid on receipt of the materials at site accompanied by manufacturers certificate for all major items like Transformer, DG Set, HT Breaker and Condition monitoring system.
- b) **15% of above items cost** shall be released after due Installation, Commissioning.
- c) For civil works , however, 95% of bill value shall be released only on completion of such items.
- d) Balance 5% shall be retained by us for one year as Retention Money for Warranty/Defect Liability Period. However, the same may be released against Performance Bank Guarantee of equivalent amount.

No Running Bill(s) shall be made and / or certified for a total value of less than Rs.10, 00,000/- (Rupees ten lakhs) only.

**17. SCHEDULE OF RATES**

All the items of work mentioned in the Schedule of Rates and covered by the Contract shall be carried out as per the Drawings, Specifications and directions of Engineer-In-Charge and shall include all labour, materials, tools, plants, tackle, testing with Contractor's testing appliance etc. required to complete the work.

**18. EXTRA ITEMS OF WORK**

During the course of execution of the work, should the contractor come across items of work which are not covered under the Schedule of Rate or not included therein, the Contractor shall draw the attention

of the Owner / Engineer-In-Charge to the same and such items of work shall be treated as extra only with the prior approval of Engineer-In-Charge in writing. Contractor shall submit a quotation along with the

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rate analysis for such accepted extra items before he commences work or purchases the materials in connection with such items.

For extra items, rates shall be derived from similar item rates included in the schedule of work. Where there is no such similar item available in the schedule, rate shall be analyzed as follows:

Rate for extra item = Cost of material (a) + cost of labour (b) inclusive of all necessary tools, tackles, equipment, machinery and consumable required to carry out the work + 10% of (a+b) towards profit and overhead.

**19. AUXILIARY POWER SUPPLY**

The bidder has to ensure that there is no interruption during the execution of the project. For this if any auxiliary supply be required then the same shall be arranged by the bidder.

However, against any requirement of auxiliary power for carrying out activities during execution such as welding etc. and for lighting purpose at the site, the same shall be under the scope of Balmer Lawrie. However the Contractor needs to submit their list of requirements to Balmer Lawrie for single phase power supply at the time of detail engineering. The list will be subjected to verification by authorized officers/Engineers of Balmer Lawrie.

**20. TESTING & INSPECTION**

Vendor shall offer all the major equipments/materials to be supplied or erected shall be tested/inspected at manufacturer's site by authorized officers/Engineers of Balmer Lawrie & Co. Ltd. or its nominated representative before dispatching them to the Work site. The Contractor shall intimate at least 15 days in advance the date of inspection of materials/equipments at manufacturer's work to authorized officer's/Engineers of Balmer Lawrie for their subsequent visit. The materials to be dispatched at site only after appropriate dispatch clearance issued by authorized officer's/engineers of Balmer Lawrie.

**21. PACKING, FORWARDING & TRANSPORTATION**

Bidder shall arrange for proper packing of all equipment, devices & materials so that it can withstand the transit and handling hassles up to delivery at our site.

Bidder shall arrange and bear the cost for the necessary transportation of the materials up to our site.

**22. LIQUIDATED DAMAGE**

- (i) If the contractor is unable to complete the jobs specified in the scope of work within the period specified in the NIT, He may request the owner for extension of time with unconditionally agreeing for payment of LD. Upon receipt of such a request, owner may at its discretion extend the period of completion and shall recover from the contractor, as an ascertained and agreed Liquidated Damages, a sum of 0.5% of contract value for each week of delay or part there of subject to a maximum of 10% of contract value.

The parties agree that the sum specified above is not a penalty but a genuine pre estimate of the loss / damage which will be suffered by the owner on account of delay / breach on the part of the contractor and the said amount will be payable without proof of actual loss or damage carried by such delay / breach.

- (ii) Notwithstanding what is stated in Clause above, the Owner shall have the right to



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**e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18** employ any other agency to complete the remaining work at the risk and cost of the Contractor, in the event of his failing to complete the work within the stipulated time.

**23. PERFORMANCE GUARANTEE & WARRANTY**

The Contractor will repair and/or replace all defective works, parts, components / fittings, accessories etc. which are notified to him in writing within the Defect Liability Period. Such defective parts, components, fittings, accessories etc. should be promptly rectified and replaced by him free of cost. The contractor will provide similar warranty on the parts, components, fittings, accessories etc. repaired and/or rejected.

**24. TAXES**

Bidders shall quote the basic rates inclusive of all taxes & charges **but exclusive of GST** for items of the BOQ(Price Bid). GST shall be paid extra as applicable. However, the bidder shall provide HSN/SAC code as may be applicable to all items in BOQ and the corresponding GST rates applicable in their letter addressed to us/uploaded in eproc site. **Without this the offer shall not be considered for evaluation.**

**25. SUB-LETTING OF WORK**

No part of the contract or any share or interest therein shall in any manner or degree be transferred assigned or sublet by the contractor directly or indirectly to any person, firm or corporation without the consent in writing from Balmer Lawrie. In the event of contractor contravening the conditions, Balmer Lawrie shall be entitled to get the work done from any other firm at the 'Risk & Cost' of the contractor.

**26. INSURANCE**

Bidder shall arrange for proper insurance coverage of all the equipments including all risk upto delivery and commissioning of the equipments at site and cost of such insurance charges shall be borne by the bidder.

**27. INDEMNITY**

The Contractor will be required to indemnify and keep indemnified the Company against all losses and claims for injury and damage to any person or any property whatsoever which may arise out of or in consequence of the work and against all claims, demands, proceedings, damages, cost, charges and expenses whatsoever that may arise against the company on account of the faults of the contractor/his workmen/due to malfunctioning of the equipment's employed by the contractor. The company may forward the bidder any such claim demand or complaint made by any other person against the company. In such event, the contractor shall solely be liable for the disposal of the said complaint. The contractor will be required to Indemnify and absolve the Company of all responsibilities related to employment condition of their employees and should adequately safeguard Company against any possible IR problems including those related to employment. Further, Company will not have any liability towards employment, remuneration or compensation in whatever manner made to the employee of the bidder. Such demand shall be settled by the bidder directly. The Contractor shall co-operate with the company

in all matters relating to introduction/adoption of new equipment technology, machinery, compliance of all relevant laws, rules or regulations, relating to CFS operations and implementation of any scheme/policies/guidelines recommended by the Company aimed at swift and better

## **28. FORCE MAJEURE CONDITIONS:**

Delivery schedule is subject to force majeure conditions as under: If at any time during the continuance of this contract, the performance in whole or part by either party of any obligation under this contract shall be prevented or delayed by reasons of any war, hostility, acts of public enemy, civil commotion sabotage, fires, floods, explosions, epidemics, quarantine restrictions, strikes, lock outs or acts of God (hereinafter referred as "events") provided notice of the happening of any such events is given by either party to the other within twenty one days from the date of occurrence thereof, neither party shall by reasons of such event, be entitled to terminate this contract nor shall either party have any claim for damages against the other in respect of such non-performance or delay in performance. Deliveries under the contract shall be resumed as soon as practicable.

## **29. ARBITRATION**

Any dispute or difference arising under this Contract shall be referred for adjudication at Kolkata to a Sole Arbitrator to be appointed by the Chairman & Managing Director, Balmer Lawrie & Co. Ltd. and the provisions of Arbitration and Conciliation Act, 1996 including any statutory modifications or enactment thereof shall apply to the Arbitration proceedings. The fees of the Arbitrator, if any, shall be shared equally by both the parties.

# **TECHNICAL SPECIFICATIONS**

## **1.0 HT PANEL**

<b>1.0</b>	<b>SWITCHGEAR</b>		
	Approved Makes	:	Siemens, Schneider, Crompton Greaves, Biocco Lawrie or their approved system integrators
<b>1.1</b>	<b>General</b>		
	Quantity	:	One (1) sets
	Type	:	Metal-clad, draw-out type
	Service	:	Indoor
	Enclosure	:	IP – 4X
	Ref. Standard	:	IEC-62271-200
	Internal Arc Classification(IAC)		AFLR
	IAC Test current & Duration		25 KA for 0.1 sec. (minimum)
	Loss Of Service Continuity & Partition Class		LSC 2B PM
<b>1.2</b>	<b>System</b>		
	Nominal Voltage (kV rms)	:	11 ± 10%
	Rated Voltage (kV rms)	:	12
	Phase	:	Three
	Rated Frequency	:	50 Hz ± 5%
	System grounding	:	Effectively Earthed
<b>1.3</b>	<b>Design ambient temperature</b>	:	50 deg C
<b>1.4</b>	<b>Rated Current inside the cubicle at design ambient temperature with fully loaded adjacent cubical and without any fan</b>		
	Bus bar	:	800 Amp
	Circuit breaker	:	800 Amp
<b>1.5</b>	<b>Short Circuit Rating</b>		
	Rated short time withstand current	:	25 kA
	Duration	:	1.0 Sec
	Rated peak withstand current	:	2.5 x rated short time current

<b>1.6</b>	<b>Insulation level</b>	
	<b>Rated lightning impulse withstand voltage</b>	<b>75kV ( peak)</b>
	<b>Rated one minute power frequency withstand voltage</b>	<b>28 kV ( r.m.s)</b>
<b>1.7</b>	<b>AC/DC Power Supply</b>	
	<b>Control voltage</b>	<b>: 24V DC for circuit breaker, protection &amp; measurement, from external DC system.</b>
	<b>Service voltage</b>	<b>: 230V ± 10%, 1 Ph, 50 Hz ± 3%</b>
<b>1.8</b>	<b>Termination details</b>	
	<b>Incomer</b>	<b>: Bottom entry cable</b>
	<b>Outgoing feeder</b>	<b>: Bottom entry cable</b>
<b>1.9</b>	<b>Painting requirement</b>	
	<b>a) Finish paint</b>	<b>: Powder coating</b>
	<b>b) Paint base</b>	<b>: Epoxy</b>
	<b>c) Paint shade</b>	<b>: RAL 7032</b>
<b>1.10</b>	<b>CT</b>	
	<b>Core-1</b>	
	<b>Ratio</b>	<b>: 400-200/1A</b>
	<b>Burden</b>	<b>: 15VA</b>
	<b>Accuracy class</b>	<b>: 1.0</b>
	<b>Core-2</b>	
	<b>Ratio</b>	<b>: 400-200/1A</b>
	<b>Burden</b>	<b>: 15VA</b>
	<b>Accuracy class</b>	<b>: 5P20</b>
<b>1.11</b>	<b>PT</b>	
	<b>Ratio</b>	<b>11000/root 3/110/root 3 Volts</b>
	<b>Burden</b>	<b>50 VA</b>
	<b>Accuracy class</b>	<b>1.0</b>
<b>2.0</b>	<b>CIRCUIT BREAKER</b>	
<b>2.1</b>	<b>Type</b>	<b>: Vacuum and draw-out type</b>
<b>2.2</b>	<b>No. of poles</b>	<b>: Three</b>
<b>2.3</b>	<b>Rated Voltage (kV rms)</b>	<b>: 12</b>
<b>2.4</b>	<b>Rated Frequency (Hz)</b>	<b>: 50 ± 5%</b>
<b>2.5</b>	<b>Rated normal current at design ambient (Amps)</b>	
	<b>Incomer</b>	<b>: 800 Amp</b>

2.6	Reference Standard	:	IEC-62271-100
2.7	Rated Insulation Level	:	
	a)Lightning Impulse withstand voltage: (kV peak)	:	75
	b)Rated one minute power freq.: withstand voltage (kV rms)	:	28
2.8	Rated Breaking Capacity	:	
	a) Rated Short-circuit breaking current(Symmetrical) (kA rms)	:	25 kA
2.9	Operating mechanism (breaker)	:	Motor wound spring charging
2.10	Operating time --	:	
	a) Opening time (msec.)	:	Not more than 60
	b) Closing time (msec.)	:	Not more than 100
2.11	Number of trip solenoids	:	One
2.12	Rated Supply Voltage and Frequency for	:	
	a) Closing	:	24V DC, 2W (85% - 110%)
	b) Tripping	:	24V DC, 2W (70% - 110%)
	c) Spring Charge Motor	:	24V DC, 2W (85% - 110%)
	d) Heater/Lamp/Socket	:	230V, 1 Ph, 2W

## PROTECTIONS

1.0 Minimum protections to be provided for different type of circuits are listed below -

- A. Feeder** : a. IDMTL over current (51) for phase fault  
Incomer
- b. IDMTL over current (51N) for earth fault
- c. Instantaneous over current (50) for phase fault
- d. Instantaneous over current (50N) for earth fault  
VT fuse failure
- d. Circuit breaker failure
- B. Auxiliary** : a. IDMTL over current (50/51) with high set instantaneous units Transformer  
for phase faults
- b. IDMTL over current (50N/51N) with high set instantaneous units for  
earth fault.

- c. Auxiliary relays for Transformer Protection like Buchholz Relay Alarm & Trip, Oil Temperature Alarm & Trip, Winding Temperature Alarm & Trip, OLTC Buchholz Alarm & Trip, Oil Pressure level and Pressure relief device operated Alarm.
- d. Circuit breaker failure.

2.0 In case any trip function is not available in a single relay, separate numerical relays shall be provided to achieve the requirement.

3.0 All protective relays shall be provided with self reset type of contacts.

4.0 Apart from protection relays, each breaker shall be provided with separate discrete auxiliary relays for anti-pumping (94), trip annunciation (30), trip supervision (74), electrically reset type breaker contact multiplication (52X) relay and lockout (86) functions. Lockout relay shall be hand reset type. For multifunction relays however, trip circuit supervision function as an integral feature of the relay is acceptable. Individual trip circuit supervision function shall be provided with respect to each trip coil of circuit breaker.

6.0 One no. DC supply supervision relay (80) shall be provided for the switchboard.

7.0 One no. DC supply failure annunciation relay shall be provided for the incoming DC supply to the switchboard.

8.0 Auxiliary relays (hand reset type) with flag indications shall be provided for each type of transformer fault.

IDMTL relay version shall be decided as per system requirement and the same shall be finalized during detail engineering.

For further details please refer HT METERING & PROTECTION SLD attached.

#### GENERAL REQUIREMENTS

#### CODES AND STANDARDS:

The design, manufacture and performance of the equipment shall comply with all currently applicable statutes, regulations and safety codes.

Unless otherwise specified, the equipment offered shall conform to the latest applicable Indian, IEC, British or USA Standards and in particular, to the following:-

a.	IS 13118/1991	High Voltage Alternative current circuit breaker
c.	IS : 3156/1992	Voltage transformers

d.	IS : 2705/1992	Current transformers.
s.	IEC-62271-200	High Voltage Switchgear & Control gear

In the event of offered equipment conforming to Standards other than the above, the salient points of comparison between the Standard(s) adopted and the relevant IS/IEC shall be indicated in the technical offer to bring out clearly how the chosen standard is equal to or better than the ones stipulated in this specification. Copies of the Standard(s) adopted shall be furnished.

#### **DESIGN CRITERIA**

Switchgear shall be used to supply power to transformers & feeders (Ref. Metering & Protection SLD attached).

Switchgear shall be located in a hot, humid and tropical atmosphere.

Switchgear ratings and quantity are detailed in the enclosed Metering & protection SLD. Equipment shall be furnished in strict accordance with the same.

For continuous operation at specified ratings, temperature rise of the various switchgear components shall be limited to the permissible values stipulated in the relevant standards and/or this specification.

#### **SPECIFIC REQUIREMENTS**

##### **Construction**

Switchgear shall be indoor, metal-clad, floor mounted, draw out type. The minimum thickness of CRCA sheet steel used shall be 2 mm.

Switchgear assembly shall comprise a continuous, dead-front, line-up of free standing, vertical cubicle. Each cubicle shall have a front hinged door with latches and a removable back cover. All covers and doors shall be provided with neoprene gaskets.

Switchgear cubicle shall be so sized as to permit closing of the front access door when the breaker is pulled out to TEST position. Maximum height of the board shall be 2600mm.

All relays, multifunctional meter, breaker control switches, selector switches and indicating lamps shall be flush mounted on the respective cubicle door. AC/DC auxiliary supply switches / isolation switches for cubicle space heater, cubicle lamp, and spring charging motor circuit shall be located inside metering compartment.

##### **Bus and Bus Taps**

The main buses and connections shall be of high conductivity aluminum, sized for specified current ratings.

Bus bars shall be of same size for the entire length of the switchgear. The Bus taps shall be as per the CT ratio.

Insulating sleeves for bus bars and cast-resin shrouds for joints shall be provided, suitable for maximum temperature rise of bus bars corresponding to maximum system voltage.

Bus insulator shall be flame-retardant, track resistant type with creepage distance suitable for polluted atmosphere.

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.

Bus bars shall be color 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 switch-gear assembly.

### **Circuit Breaker**

Circuit breaker shall be triple pole, and vacuum type. Ratings of circuit breakers shall be as per attached single line diagram / Technical specifications. The continuous ratings specified shall be achieved under installation conditions i.e. specified ambient temperature when installed within the breaker cubicle and without use of cooling fans.

Circuit breakers shall be horizontal isolation and horizontal draw-out type, having SERVICE, TEST and DISCONNECTED positions with positive indication for each position.

Mechanical safety interlock shall be provided to prevent:

- a. The circuit breaker from being racked in or out of the service position when the breaker is closed.
- b. Racking in the circuit breaker unless the control plug is fully engaged.
- c. Rack In / Out of the CB from Test to Service and vice versa with cubicle door open.
- d. The enclosure cannot be open and the low voltage circuits cannot be disconnected when the withdrawable part is in the service or intermediate position.

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

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

Breaker shall be provided with followings:

- a. Auxiliary switch, with 5 NO + 5 NC contacts, mounted on the draw-out portion of the switchgear.

Switch contact shall be rated 5 A AC. and 2 A DC at their respective operating voltage.



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### **Control & Indication**

The circuit breaker shall be wired up for local & remote operation.

Three (3) indicating lights on front of compartments:-

GREEN : Breaker Open and Spring Charged  
RED : Breaker Closed  
AMBER : Trip/Trip circuit trouble

The general scheme of connection for control, interlock and protection is shown in the enclosed drawing (SLD). Detailed requirements shall be intimated later to the successful bidder, who shall develop and furnish the schemes accordingly.

### **Current Transformer**

Current transformers shall be cast resin type.

The Current Transformers shall be capable of withstanding the stresses arising out of making, breaking and symmetrical short circuit currents for the specified durations as mentioned in the technical specification.

### **Voltage/Potential Transformer**

Voltage Transformers shall have an accuracy class of 1.0. Voltage transformer shall preferably be mounted in a separate (dedicated) vertical panel. High voltage windings of voltage transformer shall be protected by current limiting fuses. The voltage transformer and fuses shall be completely disconnected and visibly grounded in fully draw-out position.

Low voltage winding of voltage transformer shall have MCB / fuse, installed in all ungrounded secondary leads. MCBs shall be suitably located to permit easy replacement while the switchgear is energized.

### **Protective Relay**

Relays shall be of draw out design with built-in testing facilities and flush mounted at the front of panel. Relays shall be rated for operation on 110V P.T secondary voltage and 1A secondary current as shown on drawing. Number and rating of relay contacts shall suit the job requirements.

All protective relays shall be multifunction type state-of-the-art numerical relays.

Communication port for local and remote (with suitable protocol) communication shall be located in the front and rear part of the relay. Protection relay communication protocol shall be MODBUS. The relay shall be housed in dust tight enclosure, suitable for IP50 or above degree of protection.

### **Meter**

Energy meter shall be three phase multifunction, digital type with communication port.

### **Switch**

Meter selector switches shall be maintained contact, stay put type with knob handle. Ammeter & voltmeter selector switches shall be four position types. Ammeter selector switches shall have make before break feature to prevent open circuiting of CT secondary.

Breaker control switch (T-N-C) shall be multistage, spring return to normal, with lost motion device and pistol grip handle.

### **Fuse & MCB**

Fuses shall be HRC, link type, with minimum interrupting capacity equal to the listed short circuit current. Fuses shall be furnished complete with fuse bases and fittings. Visible indication shall be provided on blowing of the fuse.

MCBs shall be three/four pole, trip free, with manual close / open mechanism. Automatic tripping provision for over load and short circuit shall also be provided.

### **Push Button**

Push button shall be heavy duty, shrouded, push to actuate type with colored button and inscription plate. Each push button shall have 2 NO + 2 NC contacts, rated 10A and 0.5A at their respective AC and DC operating voltage.

### **Secondary Wiring**

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

Fuse, links and MCB 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 up to terminal blocks.

Wiring shall be done with flexible, 1100V grade, PVC insulated, FRLS type switchboard wires with stranded copper conductors of 2.5 mm<sup>2</sup> for current circuits and 1.5 mm<sup>2</sup> for control and voltage circuits.

Each wire shall be identified, at both ends, with interlocking type permanent markers bearing wire numbers as per Contractor's Wiring Diagrams. AC / DC wiring shall have separate color-coding.

Wire termination shall be made with crimping type connectors with insulating sleeves. Wires shall not be spliced between terminals.

All spare contacts of relays, timers, auxiliary switches shall be wired up to the terminal block.

### **Terminal Block**

1100V grade, multi way terminal block complete with mounting channel, binding screws and washers for wire connections and marking strip for circuit identification shall be provided for terminating the panel wiring. Terminals shall be stud type, suitable for terminating 2 nos. 2.5 mm<sup>2</sup> stranded copper conductor and provided with acrylic insulating cover. Terminals for C.T. secondary leads shall have provision for

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shorting and grounding.

Not more than two wires shall be connected to any terminal. Spare terminals equal in number to 20% active terminals shall be furnished. Separate terminal blocks shall be used for AC/ DC wiring termination.

Terminal blocks shall be located to allow easy access. Wiring shall be so arranged that individual wires of an external cable can be connected to consecutive terminals.

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**Cable Termination**

Switchgear shall be designed for cable entry from bottom, as specified. Sufficient space shall be provided for ease of termination and connection.

All provisions and accessories shall be furnished for termination and connection of cables, including removable gland plates.

Gland plates shall be minimum 3 mm thick.

Sufficient space shall be provided between the power cable termination and gland plate.

**Ground Bus**

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

The ground bus shall be provided with two-Bolt drilling with G.I. Bolts and nuts at each end to receive 75 x 10 mm G.I. flat.

**Space heaters and Plug socket**

Each cubicle shall be provided with thermostat controlled space heaters and 5A, 3 pin plug socket.

Cubicle heater, Plug/socket circuits shall have individual switch fuse units.

**TESTS**

**Type Tests**

Type tests has to be carried out on the proto type Circuit breaker & panel in accordance the provision contained in the governing specification.

If prototype test confirming to this specification has already been conducted then fresh type test may be waived off, if, it had passed the type test earlier & no change in the design or material used have been made. Certified copies of the test report shall be furnished by the contractor for consideration

**Routine Tests**

All circuit breakers shall be subjected to routine test at the manufacturer's works

Manual closing & tripping shall be carried out to ensure satisfactory operation.

Routine tests on the spring charging motor has to be done in accordance with relevant EN or IEC.

**Site Tests**

Testing & commissioning of the system shall be done at site as per IS/IEC.

## 2.0 DISTRIBUTION TRANSFORMER

### RATINGS AND REQUIREMENTS FOR 6.6 /0.433 kV LT TRANSFORMER

- |      |  |   |  |
|------|--|---|--|
| 1.0  | <b>Approved Makes</b>                        | : | Schneider, Crompton Greaves, Sudhir, Siemens |
| 2.0  | Application                                  | : | LT Auxiliary Transformer                     |
| 3.0  | Service                                      | : | Outdoor, step-down                           |
| 4.0  | Type   | : | Oil immersed                                 |
| 5.0  | Rated output                                 | : | 1250 kVA                                     |
| 6.0  | Cooling                                      | : | ONAN   |
| 7.0  | Rated voltage (line - line)                  | : | 6.6 kV / 0.433kV                             |
| 8.0  | Number of phases                             | : | 3  |
| 9.0  | Rated frequency                              | : | 50 Hz  |
| 10.  | Design Ambient : Temperature rise over 50° C |   |  |
|      | a. in oil by thermometer                     | : | 50° C  |
|      | b. in winding by resistance                  | : | 55° C  |
| 10.0 | Vector group                                 | : | Dyn11  |
| 11.0 | Parallel operation of transformer            | : | No   |
| 12.0 | Type of taps provided                        | : | Off load, full capacity                      |
| 13.0 | Paint Shade                                  | : | As per IS                                    |
| 14.0 | Taps provided on                             | : | H.V. winding                                 |
| 15.0 | Range of taps                                | : | +5% to -10% @ 2.5%                           |
|      | Method of Tap change control                 | : |  |
|      | a) Manual local                              | : | Yes  |
|      | b) Electrical Local                          | : | No   |
|      | c) Electrical Remote                         | : | No   |
|      | d) Automatic                                 | : | No   |

Percentage impedance at principal tap at 75°C

- |      |                        |               |    |                                 |          |
|------|------------------------|---------------|----|---------------------------------|----------|
|      | a)                     | 1250 kVA      | :  | 5.0% with IS tolerance          |          |
| 18.0 | System Earthing        |               |    |                                 |          |
|      | a)                     | HV            | :  | Non-effectively earthed         |          |
|      | b)                     | LV            | :  | Effectively earthed             |          |
| 19.0 | Terminal arrangement – |               | HV | :                               | HV Cable |
|      |                        | LV & N        | :  | LT Power Cable                  |          |
|      |                        | LV Neutral    | :  | Single core PVC insulated cable |          |
| 20.0 | System fault Level     |               |    |                                 |          |
|      | a)                     | 6.6 kV System | :  | 25 kA (r.m.s) for 1 sec         |          |
|      | b)                     | 433 V System  | :  | 50 kA (r.m.s) for 1 sec         |          |

#### **FITTINGS AND ACCESSORIES**

**The transformer shall be equipped with fittings and accessories as listed below: -**

- 1. Oil conservator with filler cap, drain plug and plain oil level gauge.**
- 2. Silica gel breather with connecting pipe and oil seal.**
- 3. Air release plugs.**
- 4. Pressure release device. Explosion vent, if provided, should be double diaphragm type.**
- 5. Plane oil level gauge with low level alarm contacts.**
- 6. Oil temperature indicator with maximum reading pointer and electrically separate contacts for trip and alarm.**
- 7. Winding temperature indicator with maximum reading pointer and electrically separate sets of contacts for trip and alarm.**
- 8. Thermometer pockets.**
- 9. Double float Buchholz relay with gas release cock, shut-off valve on either side or separate sets of contacts for trip and alarm.**
- 10. Filter valve with threaded adopter (top and bottom).**
- 11. Drain valve with threaded adopter.**

12. Sampling valve.

13. Jacking pads, handling and lifting lugs.

14. Cover lifting eyes.

15. Bi-directional rollers and skids.

16. Hand hole of sufficient size for access to interior of the tank.

17. Two-grounding pads.

18. Weatherproof marshalling box for housing control equipment and terminal connections.

19. Rating and terminal marking plates.

20. Cooler banks (if applicable) complete with isolation valve at both ends for each bank.

## GENERAL REQUIREMENTS

### Codes and Standards

All equipment and materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS) and IEC except where modified and/or supplemented by this specification.

Equipment and material conforming to any other standard which ensures equal or better quality, may be accepted. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.

The electrical installation shall meet the requirements of Indian Electricity Rules as amended up to date and relevant IS Codes of Practice. In addition, other rules and regulations applicable to the work shall be followed.

SL NO	ELECTRICAL ITEM	IS CODES/STANDARDS
1	Transformer	IS 2026/IS 1180
2	Bushing	IS 2029
3	Current Transformer	IS 2705
4	Routine tests	As per IS
5	Tolerance for load and No load losses	As per IS

### DESIGN CRITERIA

The transformer will be installed in hot, humid and tropical atmosphere. All equipment, accessories and wiring shall be provided with tropical finish to prevent fungus growth.

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The transformers shall be capable of continuous operation at rated output under the following condition:

- a. Voltage variation :  $\pm 10\%$
- b. Frequency variation :  $\pm 3\%$
- c. Combined voltage and frequency variation :  $\pm 10\%$

The transformer shall be capable of withstanding the short circuit stresses due to a terminal fault on one winding with full voltage maintained on the other winding for minimum period of three (3) seconds. The transformers will be free from annoying hum or vibration. The design shall be such as not to cause any undesirable interference with radio or communication circuits.

**Core & Coils**

The transformer may be of core or shell type. The core shall be built up with high grade, non-aging, low loss, high permeability grain oriented cold-rolled silicon steel laminations especially suitable for core material.

The coils shall be manufactured from electrolytic copper conductor and fully insulated for rated voltage.

Insulating material shall be of proven design. Coils shall be so insulated that impulse and power frequency voltage stresses are minimum.

Coil assembly shall be suitably supported between adjacent sections by insulating spacers and barriers. Bracing and other insulation used in assembly of the winding shall be arranged to ensure a free circulation of the oil and to reduce the hot spot of the winding.

**OFF Load Tap Changer**

The OFF Load tap changing will be effected by a 3-phase gang operated switch. Arrangement shall be such that switch can be operated at standing height from base level.

The operating handle can be padlocked at any tap position. The design shall be such that the lock cannot be inserted unless the contacts are correctly engaged.

The mechanism shall be provided with a mechanical tap position indicator.

The tap changer will be manual & OFF LOAD Condition.

**Insulating Oil**

The transformers will be filled with mineral insulating oil suitably inhibited to prevent sludging. Oil preservation shall be by means of conservator tank complete with silica gel breather and oil seal.

**Bushing**

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Bushings shall be provided with terminal connectors of approved type and size.  
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Bushing location shall provide adequate phase and ground clearances.

**Terminal Arrangements**

Terminals for cable connection shall be brought out through top cover/side wall mounted bushings to a detachable cable-end box with disconnect links.

Cable-end box shall be self-supporting, weatherproof, air filled type with sufficient space inside for termination and connection of cables.

In general, the arrangement shall be such as to permit removal of the transformer without dismantling the bus duct/cable installation.

A separate L.V. neutral bushing shall be provided for connection to station ground mat without opening the cable box.

Terminals for LV cable box shall be such to accommodate 4 runs of 400 sqmm cable & the LV cable box shall also be so designed to accommodate the same.

**Marshalling Box**

A sheet steel, weatherproof, IP5X marshalling box shall be provided for the transformer. The box shall contain all auxiliary devices except those which must be located directly on the transformer.

All terminal blocks for auxiliary cable connection shall be located in this box.

**Wiring**

All control, alarm and indication devices provided with the transformer shall be wired up to the terminal blocks.

Wiring shall be done with flexible 650V grade PVC wires in conduit or PVC armored cable. Minimum wire size shall be 2.5 mm sqmm copper. Not more than 2 wires shall be connected to a terminal. 10% spare terminals shall be provided.

All devices and terminal blocks within the marshalling box shall be identified by designations corresponding to those used in applicable schematic or wiring diagram.

**Grounding**

Two grounding pads, located on the opposite sides of the tank, shall have clean buffed surface with two tapped holes, M10 G.I. bolts and spring washers for connection to 50 x 6 mm G.I. flat.

**TESTS**

**Routine Tests**

All routine tests shall be carried out as per IS.

**Type Test**

All equipment / systems to be supplied shall conform to type tests as per relevant standards and proven type.



**Technical Specifications**

<b>Approved Makes</b>	:	<b>Schneider, L&amp;T, C&amp;S, Siemens or their authorized panel fabricators</b>
<b>1. General Requirements</b>		
1.1. Service	:	Indoor
1.2. Enclosure	:	CRCA sheet steel
1.3. Min Degree of Protection	:	IP 4X dependent on location of panel
1.4. Execution	:	Single
1.5. Incomer ACBs	:	MDO
1.6. Outgoing ACBs	:	MDO
1.7. Extensibility	:	Extensible on both sides
<b>2. Enclosure</b>		
2.1. Sheet steel min thickness (mm)	:	Structure – 2.5mm Load Bearing member - 2 mm Non-Load Bearing member – 1.6 mm internal partitions - 1 mm
2.2. Surface treatment	:	7 Tank surface treatment.
2.3. Painting	:	Epoxy painted.
2.4. Paint shade	:	RAL-7035 / IS-631
<b>3. Main Busbar</b>		
3.1. Material	:	Electrical grade Aluminum
3.2. Rated continuous current	:	As per SLD
3.3. Maximum operating Temperature	:	As per IEC 60 439 / 61 439-1 & 2.
3.4. Rated short time current (KA- RMS):	:	50kA sym for 1 Sec.
3.5. Rated dynamic short circuit Withstand current (Peak)	:	105kA peak
3.6. Heat shrinkable sleeving	:	Yes with Shrouds for Joints
3.7. Current rating of vertical busbar/ Droppers in vertical section	:	As per requirement
3.8. Busbar support	:	FRP/SMC/DMC
<b>4. Earth Bus</b>		
4.1. Material	:	Aluminum / G.I.
4.2. Section	:	50 x 10 Sq.mm size (min.)
4.3. Short circuit capacity (KA)	:	30kA current for 1 Sec.
<b>5. Relay / Protection</b>		
ACBs - Incomers	:	LSING.
Outgoings	:	LSING

**Indicating Meters**

Given below are the functions of metering usually provided by conventional meters. These function are envisaged to be performed by numerical type relays in incomer and there will be a separate ammeter and voltmeter apart from numerical relay. All other feeders shall be having load manager as mentioned in the specification.

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The requirements for meters are as follows:

- |      |                    |   |                         |
|------|--------------------|---|-------------------------|
| 5.1. | Type               | : | Digital                 |
| 5.2. | Size               | : | 96 Sq.mm                |
| 5.3. | Scale              | : | 90 Deg.                 |
| 5.4. | Input              | : | 1 A for Ammeter         |
| 5.5. | Type of connection | : | 3 Phase, 3 Wire System. |
| 5.6. | Mounting           | : | Flush                   |

#### Wiring

- |                                    |   |  |
|------------------------------------|---|--|
| Type of wire                       | : | 1100V grade multi-strand copper                  |
| Colour coding for AC and DC wiring | : | Required   |
| Size                               | : | 1.5 sq. mm for control 2.5 Sq.mm for CT circuits |
| 5.7. Ferruling                     | : | Cross ferruling required                         |

#### 6. Cables

- |                          |   |  |
|--------------------------|---|--|
| 6.1. Power cable entry   | : | Bottom                                       |
| 6.2. Control cable entry | : | Bottom                                       |
| Lugs and glands          | : | NA for power and control cable Terminations. |

## Quantity

The LT panel requirement is as follows:

<b>1) INCOMING FEEDER WITH 2000A ACB—1 NOS</b>
<b>2) BUS TIE ACB 1600A ACB (TIE WITH EXISTING. LT PANEL)—1 NO.</b>
<b>3) ACB FOR DG SET 1600A—1 NO.</b>
<b>4) 400A MCCB—2 NOS.</b>
<b>5) 250A MCCB—4 NOS.</b>
<b>6) 200A MCCB—5 NOS.</b>
<b>7) 100A MCCB—3 NOS.</b>
<b>8) 63A MCCB—3 NOS.</b>

## GENERAL REQUIREMENTS

### 1. Codes & Standards

The equipment's covered under this specification shall conform to the latest revisions of relevant Indian and International Standards some of which are listed below.

- |                   |   |
|-------------------|---|
| IS 8623-1 1993    | : Specification for low voltage switchgear & control gear assemblies                                  |
| IEC 60439 / 61439 | : Specification for low voltage switchgear & control gear assemblies                                  |
| IS 61641 2008     | : Specification for Internal Arc Containment test   |
| IS 13947 1993     | : General requirements of Switchgear and Control Gear for Voltage not exceeding 1000V AC or 1200V DC. |
| IS 11353 1985     | : Guide for uniform system of marking Identification of Busbar and Terminals                          |
| IS 13703 1993     | : Low voltage fuses   |
| IS 2705 1992      | : Current transformers  |

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- IS 694 1990 : PVC insulated cables for voltages including 1100 V with Copper and Aluminum conductor)
- IS 8623 1993 : Low voltage Switch gear & control gear assemblies
- IS 5082 : Electrolytic Aluminum & Aluminum busbar, Trunking system, Rod tubes & Sections for Electrical purposes
- IS 13779 1999 / : AC Electric Meters / Static Meters.

**2. General Requirement and Selection of Components:**

**Shall comply with the Technical Data Sheet, SLD, Feeder List. Salient features have been highlighted as under:**

- 2.1 Panels will be of **Single Front**, and compartmentalized bolted construction.
- 2.2 Degree of Protection for the Panels should be IP 4X .
- 2.3 All ACB panels shall be **single tier**.
- 2.4 Vertical bus bars of panels shall be accessible from side of panel without removing feeder base plate.
- 2.5 All Incoming ACB's shall be MDO Type.
- 2.6 Incomer shall be Suitable for Bottom cable/bus connection.
- 2.7 All Outgoing Air Circuit Breakers shall be of MDO Type as specified in the SLD.
- 2.8 All ACBs shall have integral LSING Protection through Micro Processor based Release.
- 2.9 The ACB releases shall be detachable & upgradeable at site.

**3. Constructional Features**

- \* The switch board shall be metal clad sheet steel enclosed cubicle, fully compartmentalized, floor mounting type suitable for indoor installations. All the doors and covers shall be fully gasket to prevent any ingress of dust. The enclosure shall be for Indoor type and completely dust, damp and vermin proof. Gasket used for all doors shall be of double lip type.
- \* The switchboard cubicles shall have structural steel frame work enclosed on all sides and top by CRCA sheet steel of minimum thickness specified.
- \* The switchboard shall have integral base frame.
- \* 3mm thick Removable undrilled gland plates shall be fitted for bottom cable entry.
- \* All fixing bolts, screws etc. appearing on the panel shall be so arranged as to present a neat appearance.
- \* Door hinges shall be concealed type.
- \* Front access shall be available to all components in each cubicle which require adjustment, maintenance or replacement.

**4. Busbars and insulating materials**

- \* The bus-bars connections and bus taps to individual feeders shall be by means of electrolyte Aluminium suitably tested to conform to Type Tested Assemblies (TTA) as per IS 8623-1 / IEC 60439 -1 &2 to be quoted. Busbars shall be color coded for ready identification of phases.

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**e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18** The busbar sizes shall be determined taking into consideration the continuous rating and fault level of 50 KA (1 sec) without exceeding the final temperature as per IEC.

- \* Auxiliary busbars each of minimum 5x5 sq. mm thick electrolytic tough pitch copper shall be provided for following applications. Exact number of busbars shall depend on various controls, metering and auxiliary power distribution requirements.
  - a) Panel space heater supply – 230 V AC (2 wires)
  - b) AC / DC control supply for breaker closing & tripping closing and indication circuits - 230 V AC (2 wires)
  - c) Control supply for breaker spring charging motors - 230 V AC (2 wires)
  - d) Control supply for motor starter control circuits - 230 V AC (2 wires)
- \* The bus-bars shall be supported of regular intervals using FRP, SMC or DMC insulators It should have Very high Comparative Tracking Index (CTI > 600 as per IS 2824)
- \* The busbars shall be colour coded using identifying colour rings at regular interval. Red, Yellow & Blue colour shall be used for phases & Black for neutral. The earth busbar shall be identified with Green colour rings at regular intervals.
- \* Minimum clearance between phases / live parts shall be 19 mm and phases / live parts / neutral to ground shall be 19 mm except on the equipment terminals.
- \* Spare contacts shall be wired upto terminal block. Auxiliary contacts in the "trip" circuit shall close before the breaker main contacts close and shall open after the main contacts have opened. All other contacts shall operate simultaneously with the main contacts.
- \* The circuit breakers shall be equipped with Integral Micro Processor based Numerical Relays which shall have current setting, etc.

**5. Earthing**

Earthing - Two earth terminal shall be provided on each side of switchboard. An earth bar of atleast 50 x 10 mm Aluminium/GI suitable for 30kA for 1 sec. shall be provided. The earth bar shall be electrically continuous and shall run the full extent of each board. This earth bar shall be on the same side as the cable entry. Each unit shall be constructed to ensure satisfactory electrical continuity between all metal parts not intended to be alive and earth terminals of the unit.

**6. Internal Wiring:**

- 6.1. Minimum size of conductor for power circuits shall be 2.5 sq. mm copper.
- 6.2. All control wiring except CT secondary wiring shall be carried out with minimum 1.5 sq. mm copper conductor. CT secondary wiring shall be carried out with 2.5 sq. mm copper conductor.
- 6.3. All wiring shall be securely fixed and neatly arranged to enable easy tracing of wires.
- 6.4. All terminal blocks and wires shall be tagged for identification in accordance with IS 11353
- 6.5. All wiring for external connections shall be brought out to the individual terminals on a readily accessible terminal block; all terminal block shall be shrouded or provided with transparent covers.
- 6.6. Clamp type control terminal blocks shall be provided for outgoing control cables. Minimum 10% spare terminals shall be provided for future use. Control terminal block shall be separated from power terminal blocks by means of an insulating barrier.

**7. Cable Terminations:**

- 7.1. Cable entry to switchgear shall be from bottom of the switchgear as specified in the technical particulars.

- 7.2. Ample space shall be provided in the cable compartment to accommodate XLPE insulated aluminum conductor cable as specified in the technical particulars. The cable box & the cable terminations shall be so arranged such as to accommodate 4 runs of 400sq.mm cable for transformer incoming ACB & Tie breaker ACB to existing panel & 2 runs of 300sq.mm cable for DG set incomer ACB.
- 7.3. Removable undrilled gland plate shall be provided for termination of Cables.

#### **8. Name Plates & Label**

- \* One nameplate giving designation of the switchboard shall be affixed prominently on top. Details of designation shall be specified.
- \* Labels giving following details shall be affixed on each feeder panel:-
- \* Feeder No - As per feeder list
- \* Equipment tag Number and Description
- \* Rating (KW/KVA/AMP)
- \* All components whether mounted inside the switchboard or on the door shall be permanently and clearly labeled with reference number and/or letter of their function. These labels should be fixed so that they are easily visible.
- \* Labels for feeder panel designation shall be fixed on the front side of respective panels with Special rivet made of nylon. These labels shall be identical size to permit interchange.

#### **9. Testing and Inspection**

- \* All routine tests specified in relevant Indian Standards and witnessed by buyer.
- \* Manufacturer shall submit all following type test report as per IS 8623-1 / IEC 60439 / 61439-1&2 standards at the time of drawing approval / offer submission:
  - o Short Circuit withstand test for main Busbar and neutral Busbar
  - o IP test certificate for IP 4X
- \* Operation of all meters.
- \* Secondary wiring continuity test with a low voltage (6 volts) tester.
- \* Insulation test with 1000 volts Meggar, before and after H. V. test.
- \* H. V. test at 2.5 kV for 1 minute.

## **4.0 DG SET**

### **Approved Makes: Kirloskar, Cummins, Greaves Cotton, Jackson**

#### **Detailed Specification of Outdoor, Silent Type 1 No. 400 KVA Diesel Generating Sets.**

The one number 400 KVA, 415 Volt Silent type, CBCB approved DG Set required shall be self-excited, self regulated, star connected, brush less, water-cooled and designed as indicated to give required output including the following :-

#### **ENGINE :**

The Diesel Engine shall be liquid-cooled type and capable of giving the required BHP at 1500 rpm in extreme ambient conditions mentioned in the specification. It shall generally be in accordance with ISO-3046, BS-5514. The engine shall be 4 stroke, 10/12 cylinders. The engine shall be capable of taking an overload of 10% for one hour during any 12 continuous hours running. Suitable starting arrangement shall be provided. The following items shall be included with the engine.

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1. Suitable Turbo charger using waste energy.
2. 24V electric starting system as applicable, complete with starter gear-ring, starter motor and batteries.
3. 24V battery charger with trickle and float charging suitable for drawing power from 230 volt A.C supply.
4. Radiator, cooling fan and water circulating pump etc of high performance or whatever system required for efficient cooling as per IS.
5. Instrument panel should consist of but not limited to the following:-
  - a. Start and stop push button.
  - b. Lubricating oil pressure gauge.
  - c. Water temperature gauge
  - d. Fuel level indicator
6. Flywheel with suitable housing
7. Flexible coupling with safety guard.
8. Fuel injection system complete with injector pump, nozzle, governor
9. Fuel shutdown solenoid 24VDC
10. Air Filter
11. Engine protection unit with safety control for low lubricating oil pressure and high water temperature.
12. Anti vibration mounting pads.

**ALTERNATOR :**

The AC alternator shall be rated for 3-phase, 4-wire, 415V, 50Hz operating system. It shall be rated for running at 1500 rpm. It shall be brush-less type and capable to catering load up to 0.8 (lagging) power factor. It shall be self regulated, self excited, screen protected drip proof and fitted with end shield, ball/roller bearings etc. It shall be provided with class "F" or "H" insulation. Required current transformers shall be provided for required protection of the generator. The Alternator shall generally conform to IS:4722.

**ACOUSTIC ENCLOSURE :**

The Diesel Generating set shall be housed inside a factory built, high quality, ready to use acoustic enclosure as per CPCB norms. The noise level should be reduced to adhere to all mandatory noise regulation norms. Proper clearances in all sides of the DG set shall be provided for easy maintenance. The enclosure shall be duly treated for degreasing, pickling, phosphating and passivation. Its surfaces shall be finished with powder coating/epoxy painting.

The fuel tank for capacity shall be adequate to store diesel sufficient to run it for minimum 10 hours at 75% load and placed inside the enclosure. There shall be provision of proper illumination inside the enclosure to facilitate maintenance of the DG Set. The insulating materials of approved grade to be used for the purpose, shall have high sound absorption quality, high temperature withstand capacity and high fire retardant capability. It shall conform to IS: 8183.

**CONTROL PANEL :**

The control panel shall be installed inside the acoustic enclosure. It shall be fabricated out of sheet steel and have hinged doors, removable bottom gland plate, bus bar arrangement for incoming & outgoing cable end termination and required protections and metering arrangements. It shall be dust proof,

vermin proof, totally enclosed suitable for indoor use with IP:52 class of protection. The cable entry

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facility shall be provided from bottom.

The control panel shall primarily consist of an 800Amp TPN MCCB along with microprocessor release provided for S/C protection having variable time delay facility. Arrangement for termination of adequate number and sizes of XLPE type 1100 volt grade armored aluminum cable shall be made on the outgoing MCCB. Following measuring instruments shall be fitted to the control panel.

1. One number 0-500 volt AC voltmeter with selector switch and control fuses.
2. One number 0-800 Amp AC ammeter with required current transformers and selector switch.
3. One number power factor meter.
4. Push buttons for Engine start, Engine stop, reset etc.
5. Window fault annunciation for Under/over speed, Low oil pressure, low fuel level, low coolant level, high canopy temp, Start/ Stop fail etc.
6. KWH Meter
7. KW Meter

## **5.0 HT & LT CABLES**

Cables shall be furnished in accordance with this specification and the following annexure :-

- a. HV. Power Cables : Annexure A
- b. LV. Power Cables : Annexure B

### **GENERAL REQUIREMENTS**

#### **DESIGN CRITERIA**

The Cables will be used for connection of power and control circuits of the auxiliary electrical systems.

Cables will be generally laid on ladder type trays or drawn through rigid PVC/GI/HDPE pipe/conduits or directly buried in ground depending on layout requirement.

For continuous operation at specified rating, maximum conductor temperature shall be limited to the permissible value as per relevant standard or this specification which one is more stringent.

### **SPECIFIC REQUIREMENTS**

#### **H.V. Power Cables**

**Approved Makes: Gloster/Polycab/Havells/Universal/RPG or equivalent**

The type and quantity shall be furnished as mentioned below :-

#### **L.V. Power Cables**

**Approved Makes: Gloster/Polycab/Havells/Universal/RPG or equivalent**

The type and quantity shall be furnished as mentioned below :-

#### **H.V. POWER CABLES**

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11KV (E) grade XLPE heavy duty power cable suitable for use in 11 KV earthed system conforming to following requirement and in line with IS 7098.

Conductor should be stranded and compacted aluminum conductor

Conductor Screen Extruded semi-conducting compound.

Insulation Extruded cross-linked polyethylene (XLPE) conforming to IS 7098(Part-2)

Insulation Screen Extruded semi-conducting compound with a layer of non-magnetic metallic tape.

Core Identification By colored strips applied on cores or by numerals.

**LV POWER CABLE (XLPE TYPE)**

1100 V grade, XLPE heavy duty, power cable conforming to following requirement and in line with IS 7098.

Insulation Extruded cross-linked polyethelene (XLPE) conforming to IS:7098(Part-3) Core Identification By color coding.

## **6.0 ONLINE CONTINUOUS CONDITION MONITORING**

The Electrical infrastructure that is to be set up as a part of this project is critical to Balmer Lawrie and hence it is important that the health of each of the critical assets are properly monitored so that the organization can be alerted well before any potential failure. The critical assets involved in the infrastructure are as follows:

- ❖ MV Switchgear
- ❖ MV Cables
- ❖ LT Switchboards

In the following sections Condition Monitoring Solutions for each of these critical assets are defined and the bidder has to follow the minimal specifications given below. The Scope includes supply, installation, commissioning and integrated testing of the overall solution along with training the maintenance team at Balmer Lawrie.

**Approved Makes: SDMT, Qualitrol, Vectron/Sengenuity, Intellisaw/Prysmian**

### **6.1 Real Time Temperature for Newly Installed LT panels**

**TECHNICAL SPECIFICATIONS:**

Real Time Temperature monitoring for the Cable Terminations & breaker contact points (for Incoming & Outgoing breaker panels) for 415 V Panel to be installed at Balmer Lawrie CFS. The solution shall have one

sensor permanently mounted on each of the cable terminations & breaker contact points (for Incoming & Outgoing breaker panels) inside the 415 V Panel and the sensor shall be capable of measuring the



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temperature at the contact point. The sensor should be a passive device that does not require any power supply for their operation. The solution shall be able to automatically collect the data from the sensors and transmit them to a PC compatible software platform for necessary display, trending and generation of alarms. This would involve necessary antennae and "Reader" units as a part of the integrated solution.

The minimal specifications that should be complied by the Sensors, Readers and Antennae are as given below:

**READERS:**

The Readers shall be complete with necessary Power Supply Unit and shall be the base capable of capturing the signals from the Wireless Sensors. The Reader shall be a highly sophisticated Sensor Interrogation Unit and shall be designed to monitor Multiple Sensors simultaneously. The indicative specifications of the Reader Units are as given below:

SPECIFICATION	MIN.	TYP.	MAX.	UNIT
Operating Frequency	428 or any free band frequency		439.5 or any free band frequency	MHz
Ports	No. of Readers should be such to accommodate/interrogate all the Sensors listed in figure-1 below			
Data Bus Interface		RS485		
Data Protocol		Modbus		
Operating Temperature	-30		+70	°C
Humidity			80	%
Supply Voltage	+9	+24	+30	VDC
Length	Shall be such that it can be easily accommodated in the panels shown in Fig-1			
Width				
Height				

Equipments with a higher range in both the lower & higher sides are acceptable.

**SENSORS:**

The Passive Sensors are bolted to specific Cable/Breaker/Bus bar Joints. The Sensors to be supplied shall be Wireless Type and passive in nature. The detail Specifications for the Sensors are given below:

SPECIFICATION	MIN	TYP.	MAX.	UNIT
Operating Temperature	-25		+120	°C
Number of Sensors per Antenna/ Equivalent			As required	
Temperature Accuracy		±4		°C

Equipments with a higher range in both the lower & higher sides are acceptable.

**ANTENNAS:**

The Wireless Sensors shall be Interrogating and Communicating with the Reader unit through these

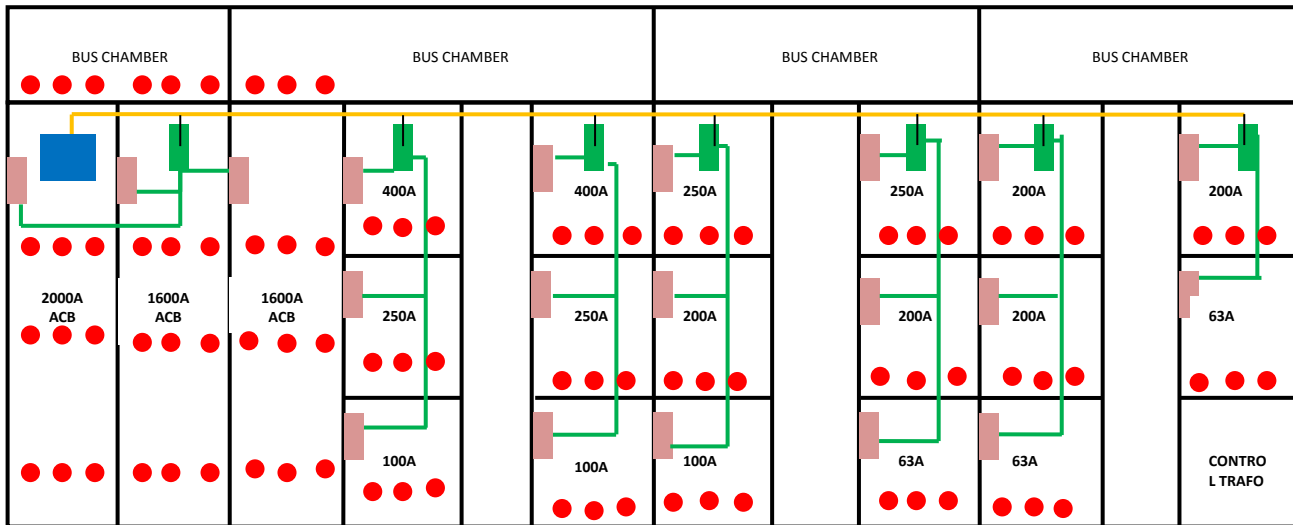
**e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18**

Antennas, Suitable Antennas need to be considered in the designing of the solution and need to be supplied and installed. These Antennas shall be connected to the Reader via suitable wires. The detail Specifications of the Antenna is given below:

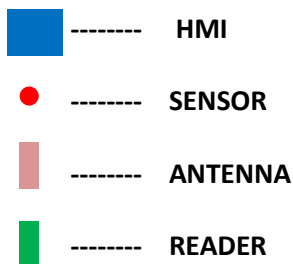
**1. Electrical and Mechanical Specifications:**

- Gain: Maximum +3.0 dBi or higher
- Impedance: 50 Ω
- Connector: SMA
- Dimension (L X W X H): Shall be such that it can be easily accommodated in the panels shown in Fig-2
- Operating Temperature Range: -25°C to +70°C

Equipments with a higher range in both the lower & higher sides are acceptable.



**Figure: 1**



In figure-1 above tentative location arrangement of the Temperature sensors, Antennas, Reader & HMI has been shown. Abnormal heating of the joints viz. 3 Cable terminations, 6 Breaker contacts (In & Out) & 3 Busbar contacts for Breaker panels & 3 cable terminations for other feeder panels, tentatively shown in Figure-1 has to be monitored & the data should be sent to the HMI for local display.

**Quantity Schedule:**

SL NO.	ITEM DESCRIPTION	QUANTITY (NOS.)
--------	------------------	-----------------

**e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18**

e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18		
1	PASSIVE SENSORS / TEMP POINTS TO BE MEASURED	87
2	ANTENNA OR EQUIVALENT	20 / As required
3	READER OR EQUIVALENT	7 / As required
4	HUMAN MACHINE INTERFACE (HMI)	1

**List of Spares**

SL NO.	ITEM DESCRIPTION	QUANTITY (NO.S)
1	PASSIVE SENSORS	9
2	ANTENNA OR EQUIVALENT	3 / As per ratio in the quantity schedule
3	READER OR EQUIVALENT	2 / As per ratio in the quantity schedule

**Special note:** The overall design of the temperature monitoring solution for the LT panel has to be done by the Vendor. The design should ensure temperature monitoring of the contacts shown in figure:1. The final bill of material & the quantities of antennas & Readers are to be decided by the Vendor. Cost of all above items shall be included in item-8 of the BOQ for supply.

**6.2 CONDITION MONITORING FOR HT/MV CABLE & SWITCHGEAR**

There are two HT Switchgears (One belongs to CESC and the other one belongs to Balmer Lawrie). The CESC breaker panel is feeding to the Balmer Lawrie one through HT Cable and then another HT cable connects the Balmer Lawrie owned HT Panel to the HT Termination box of the Transformer. A comprehensive and effective solution to monitor these HT cables and Switchgear Panels is required.

The solution shall be a comprehensive one that should be able to monitor the Partial Discharge in the cables as well as the HT Panel owned by Balmer Lawrie.

The project consists of two sections of 3 core 11 kV cables required for this project. One of the cables shall connect the Transformer and the MV Panel owned by Balmer Lawrie and the other cable shall connect the MV Panel of CESC with the MV Panel owned by Balmer Lawrie. These cables shall be fitted with HFCTs as shown below and the HFCTs shall be connected to a suitable Partial Discharge Monitoring Unit as shown below in Figure 1. There shall be one TEV (Transient Earth Voltage) sensor that should be magnetically latched on the metal body of the HT Panel and connected to the PD Monitoring Unit. Thus the PD Monitoring Unit shall have at least three channels to accommodate two HFCTs and one TEV sensor.

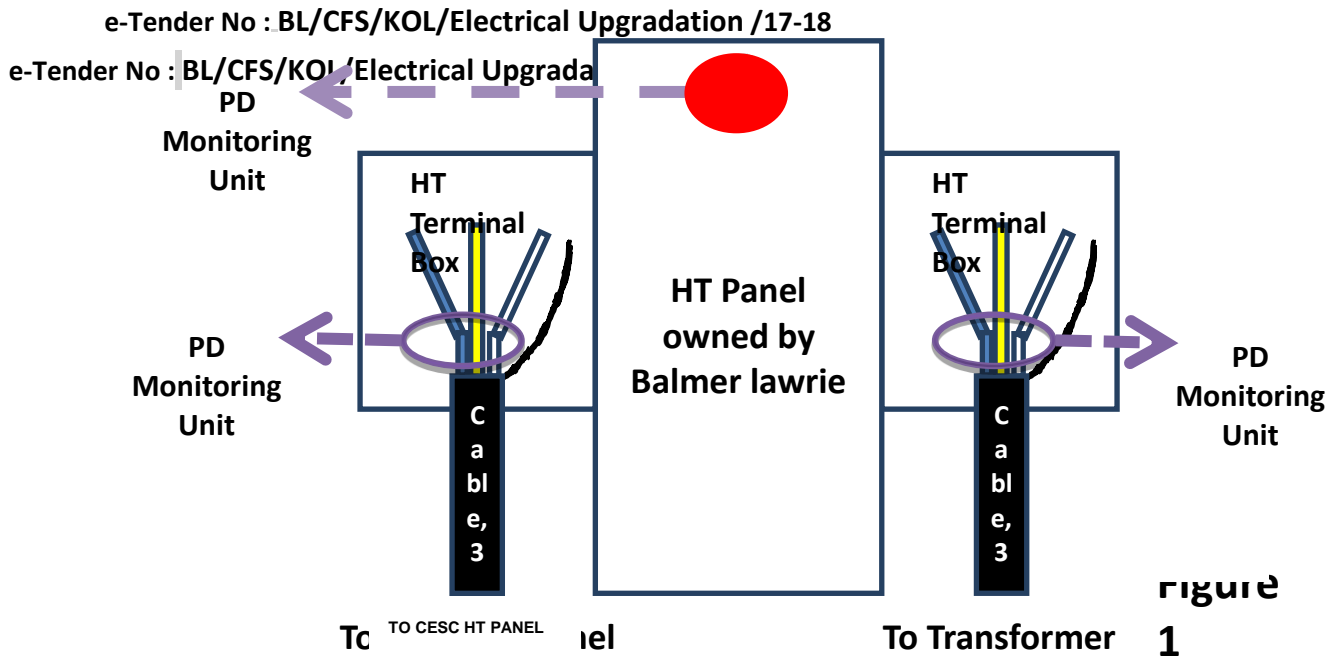


Figure-2

The Technical Specifications of the PD monitoring Unit shall be as given below:

Sl No.	Parameter	Specifications
1	Minimum PD measuring Channels (HF)	3
2	Quantity	Should be Adequate for 2 No.s HT Cables & 1 No.s Switchgear
2	Type of Sensors	RFCT for Cable PD measurement Coupling Capacitors for Switchgear PD measurement
3	Application	The unit shall be typically designed for 11kV Cables & Switchgears
4	Frequency Range	0.5 MHz to 15 MHz
5	PD Range	20 pC to 1,00,000 pC
6	Sample Rate	100MS/s
7	PD Location accuracy	Max. 1 % of the total Cable length & 1 meter for HT Panels
	PRPD phase resolution	7.5°
8	Operating Temperature	-40 to +60 degree C
9	Interface	RS-485/Optic fibre/ USB
10	Power Supply	90-260VAC (Shall be supplied by BALMER LAWRIE at the required point)

11	Software	The software should show the PD data in the form of: a) Location of PD source using TDR (Time Domain Reflectometry) Technology PRPD data, PD pulse concentration location & expert software for analysing the defect type
		b) The software should have a proper GUI to interface the Normal, Alarm & Warning signals for every Cable & Feeder panels
		The GUI shall be capable of interfacing the PRPD, PD intensity, PD Amplitude, PD Pulse count, PD Trend etc
		The software should be capable of storing historical data of Alarms & Warnings of PD & the system

**DECLARATION**

Having examined the tender documents, we have understood the terms & conditions indicated in the e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18 and hereby confirm our acceptance of the same.

Place :

Signature of Tenderer

Date :

Name & Address

Telephone Nos.

Office:

Fax Nos. :

e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18

e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18

## Drawings

1. GENERAL SLD : DRG. NO. BLC/CFS/KOL/17-18/01
2. HT PROTECTION SLD : DRG. NO. BLC/CFS/KOL/17-18/02
3. LT PROTECTION SLD : DRG. NO. BLC/CFS/KOL/17-18/03
4. PROPOSED 400 KVA DG SITE & CABLE TRENCH : DRG. NO. BLC/CFS/KOL/17-18/04
5. LEGEND : DRG. NO. BLC/CFS/KOL/17-18/05

**PARTICULARS OF THE TENDERER'S ORGANISATION**

S. No	Description	Tenderers Details
1	Name of the Tenderer	
2	Address of the Registered Office	
3	Address of the branch / office quoting against the Tender	
4	Year of commencement of business	
5	Whether Sole Trader/ Partnership / Private Limited Co., or Public Limited Co./ LPP	
6	Registration No. (Under companies Act )	
7	Whether copy of Incorporation /Registration certificate from ROC(Registrar of company) uploaded	
8	Income Tax PAN no.	
9	Whether copy of PAN enclosed	
10	Whether copy of latest Income Tax Return uploaded	
11	GST Registration No. (copy to be attached)	
12	Service Tax Registration. No.	
13	Whether copy of Service Tax Registration certificate Uploaded	
14	Name of the Banker	
15	Whether registration under MSMED act	
16	In case registered under MSMED provide registration number and copy of registration certificate.	
17	In case of MSME vendor, mention if they fall under SC/ST Category. Provide Certificate of SC/ST if applicable.	

**Note: Above details should be submitted separately for lead organization and each consortium partner**

**BOQ (Price Bid)**

PRICE SCHEDULE					
SL NO.	ITEM DESCRIPTION	QUANTITY	UNITS	RATE	AMOUNT
<b>SUPPLY</b>					
1	1250 KVA ONAN Dyn11 6.6/0.433KV Distribution Transformer	1	NO		
2	11KV HT SWITCHGEAR-800 A WITH ALL NECESSARY ACCESSORIES	1	SET		
3	LT PANELS (As per specification) WITH ALL NECESSARY ACCESSORIES	1	SET		
4	DG SET (400KVA)-415V-3PH 4W	1	NO		
5	HT POWER CABLES (3 CORE 185mm SQR. AI) ARMOURED [GRADE 11KV (E)] XLPE	50	METRE		
6	LT POWER CABLES (3.5 CORE 400mm SQR. AI) ARMOURED [GRADE 1100V] XLPE	200	METRE		
7	LT POWER CABLES (3.5 CORE 300mm SQR.) ARMOURED [GRADE 1100V] XLPE	80	METRE		
8	ONLINE CONDITION MONITORING EQUIPMENTS FOR HT CABLE, HT PANEL & LT PANEL	1	SET		
	<b>SUB TOTAL FOR SUPPLY ITEMS</b>				

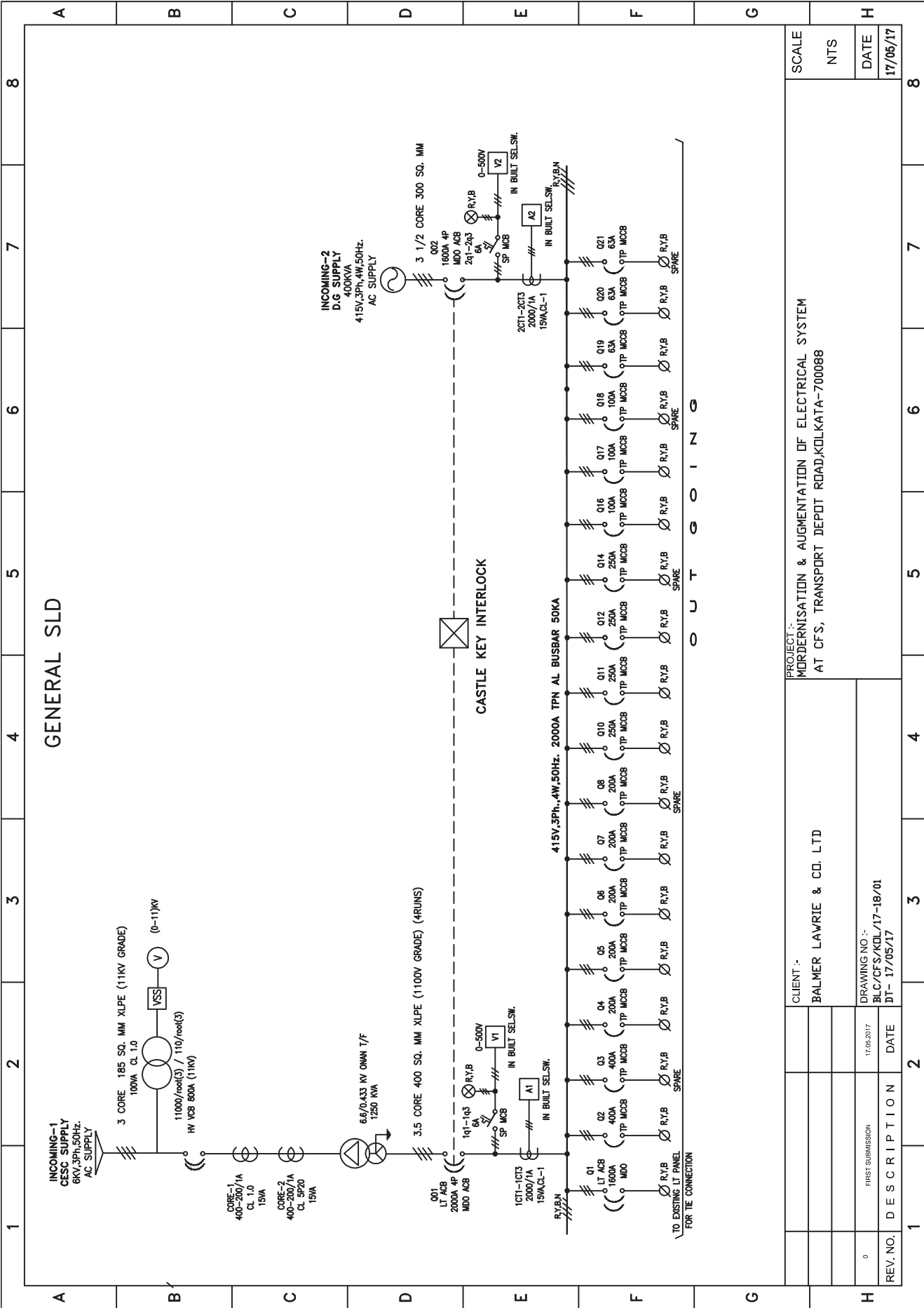


e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18

e-Tender No : BL/CFS/KOL/Electrical Upgradation /17-18

### ERECTION & COMMISSIONING

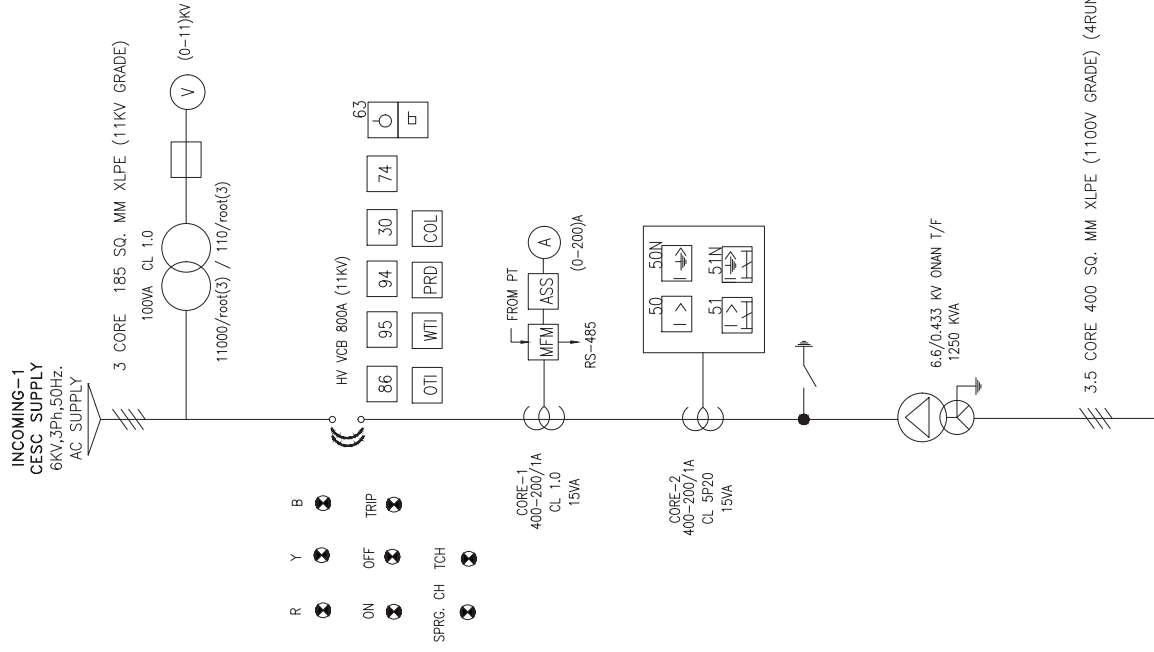
1	INSTALLATION & COMMISSIONING OF 1250KVA TRANSFORMER	1	SET		
2	INSTALLATION & COMMISSIONING OF HT PANEL	1	SET		
3	INSTALLATION & COMMISSIONING OF LT PANELS	1	SET		
4	INSTALLATION & COMMISSIONING OF DG SET	1	SET		
5	CABLE LAYING	1	LS		
6	CIVIL WORKS (CABLE TRENCH, FOUNDATION, ETC)	1	LS		
7	EARTH PIT	6	NO		
8	INSTALLATION & COMMISSIONING OF CONDITION MONITORING EQUIPMENTS	1	SET		
	<b>SUB TOTAL FOR WORKS /EXECUTION ITEMS</b>				
	<b>GRAND TOTAL</b>				



GENERAL SLD

PROJECT :-	MERNERISATION & AUGMENTATION OF ELECTRICAL SYSTEM AT CFS, TRANSPORT DEPOT ROAD, KOLKATA-700088
CLIENT :-	BALMER LAWRIE & CO. LTD
DRAWING NO :-	BLC/CFS/KOL/17-18/01
FIRST SUBMISSION	DATE
REV. NO.	DESCRIPTION
0	DATE
17.05.2017	DATE
17/05/17	DATE
SCALE	NTS
DATE	17/05/17

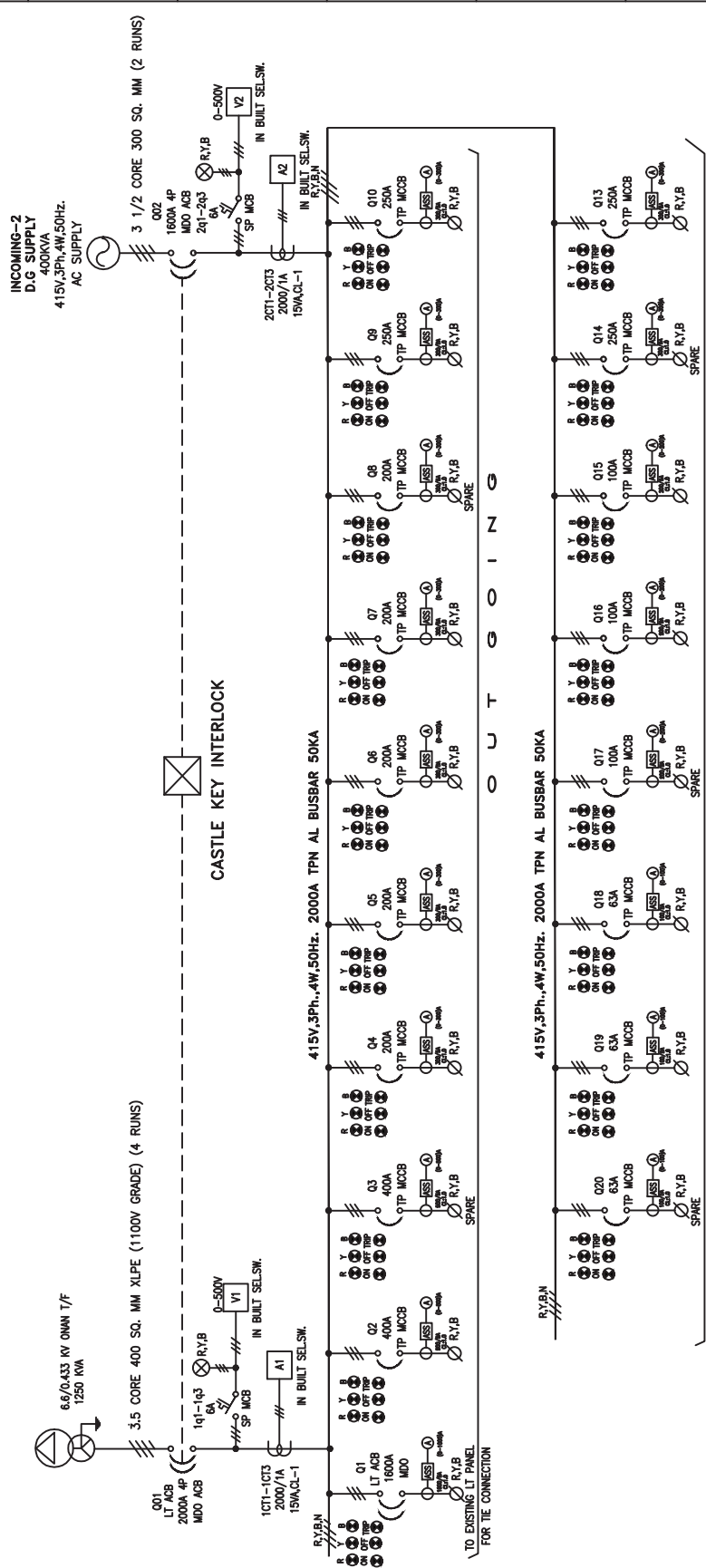
# HT PROTECTION SLD



- R
- Y
- B
- ON
- OFF
- TRIP
- SPRG. CH TCH

CLIENT :-		BALMER LAWRIE & CO. LTD	
PROJECT :-		MODERNISATION & AUGMENTATION OF ELECTRICAL SYSTEM AT CFS, TRANSPORT DEPOT ROAD, KOLKATA-700088	
DRAWING NO :-		BLC/GF S/KOL/17-18/02 DT - 17/05/17	
REV. NO.	DESCRIPTION	DATE	
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SCALE		NTS	
DATE		17/05/17	

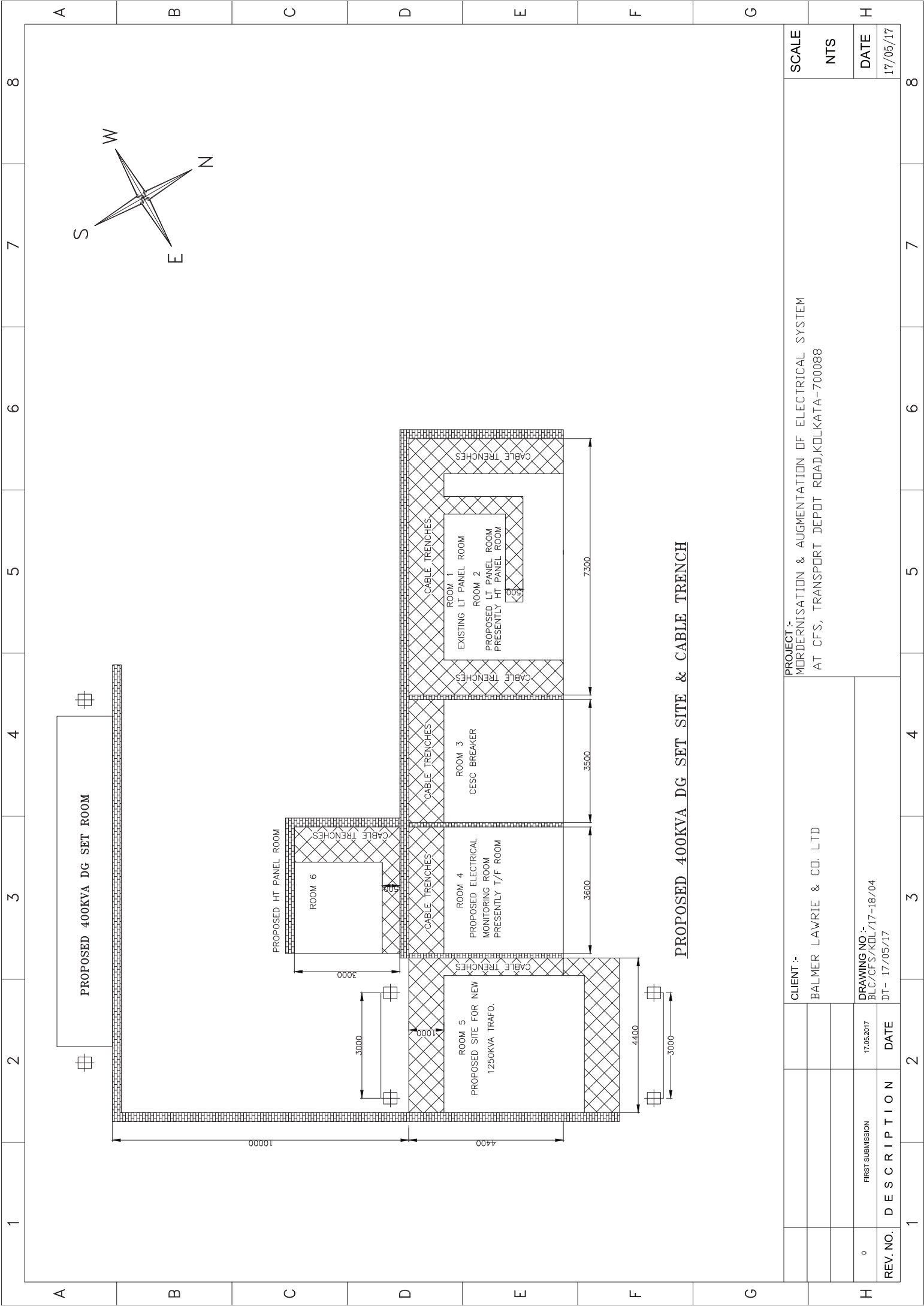
# LT PROTECTION SLD



<p>CLIENT :- <b>BALMER LAWRIE &amp; CO. LTD</b></p>	<p>PROJECT :- <b>MODERNISATION &amp; AUGMENTATION OF ELECTRICAL SYSTEM AT CFS, TRANSPORT DEPOT ROAD, KOLKATA-700088</b></p>
<p>DRAWING NO. :- <b>BLC/CFS/KOL/17-18/03</b></p>	<p>SCALE NTS</p>
<p>DATE <b>17/05/17</b></p>	<p>DATE <b>17/05/17</b></p>














































1	2	3	4	5	6	7	8
A	B	C	D	E	F	G	H

1	2	3	4	5	6	7	8
A	B	C	D	E	F	G	H



**PROPOSED 400KVA DG SET SITE & CABLE TRENCH**

REV. NO.		DESCRIPTION		DATE		17/05/2017	
0		FIRST SUBMISSION					
CLIENT :-				BALMER LAWRIE & CO. LTD			
PROJECT :-				MODERNISATION & AUGMENTATION OF ELECTRICAL SYSTEM AT CFS, TRANSPORT DEPOT ROAD, KOLKATA-700088			
SCALE		NTS		DATE		17/05/17	
1		2		3		4	
5		6		7		8	

1	2	3	4	5	6	7	8	
A	<p><b>LEGEND:</b></p> <p> TRANSFORMER</p> <p> HT CIRCUIT BREAKER (VCB)</p> <p> VOLTAGE TRANSFORMER</p> <p> VOLTAGE TRANSFORMER WITH 2 SECONDARY WINDING</p> <p> CURRENT TRANSFORMER</p> <p> DRAWOUT</p> <p> MULTI FUNCTION METER</p> <p> CURRENT TRANSDUCER</p> <p> AMMETER SELECTOR SWITCH</p> <p> AMMETER</p> <p> OVER VOLTAGE RELAY</p> <p> SUPERVISION RELAY</p> <p> FUSE FAILURE RELAY</p> <p> INDICATION LAMP</p> <p> EARTH SWITCH</p> <p> DC FAILURE RELAY</p> <p> DC FAILURE RELAY</p>							A
B	<p> 74 TRIP CIRCUIT RELAY</p> <p> 27 U&lt; UNDER VOLTAGE RELAY</p> <p> VSS VOLTMMETER SELECTOR SWITCH</p> <p> (V) VOLTMMETER</p> <p> HRC FUSE</p>							B
C	<p> 30 ANNUNCIATOR RELAY</p> <p> 50 I&gt; INSTANTANEOUS OVER-CURRENT RELAY</p> <p> 50N I+&gt; INSTANTANEOUS EARTH-FAULT RELAY</p> <p> 50S I+&gt; DEFINITE TIME (ADJUSTABLE) CBCT OPERATED SENSITIVE EARTH FAULT RELAY</p> <p> 5 I&gt; INVERSE TIME OVER CURRENT RELAY</p> <p> 5IN I+&gt; INVERSE TIME EARTH FAULT RELAY</p> <p> 94 ANTI PUMPING RELAY</p> <p> 63 O BUCHHOLZ RELAY (ALARM &amp; TRIP)</p> <p> OTI OIL TEMP. INDICATOR (ALARM &amp; TRIP)</p> <p> WTI WINDING TEMP. INDICATOR (ALARM &amp; TRIP)</p> <p> PRD PRESSURE RELIEF DEVICE (TRIP)</p> <p> COL CONSERVATOR OIL LEVEL (ALARM)</p> <p> PSR PHASE SEQUENCE RELAY</p>							C
D	<p> TRANSFORMER</p> <p> HT CIRCUIT BREAKER (VCB)</p> <p> VOLTAGE TRANSFORMER</p> <p> VOLTAGE TRANSFORMER WITH 2 SECONDARY WINDING</p> <p> CURRENT TRANSFORMER</p> <p> DRAWOUT</p> <p> MFM MULTI FUNCTION METER</p> <p> AT CURRENT TRANSDUCER</p> <p> ASS AMMETER SELECTOR SWITCH</p> <p> (A) AMMETER</p> <p> 50 U&gt; OVER VOLTAGE RELAY</p> <p> 95 SUPERVISION RELAY</p> <p> 96 FUSE FAILURE RELAY</p> <p> ⊗ INDICATION LAMP</p> <p> ●—/→ EARTH SWITCH</p> <p> 80 DC FAILURE RELAY</p> <p> 86 DC FAILURE RELAY</p>							D
E	<p> 74 TRIP CIRCUIT RELAY</p> <p> 27 U&lt; UNDER VOLTAGE RELAY</p> <p> VSS VOLTMMETER SELECTOR SWITCH</p> <p> (V) VOLTMMETER</p> <p> HRC FUSE</p> <p> 30 ANNUNCIATOR RELAY</p> <p> 50 I&gt; INSTANTANEOUS OVER-CURRENT RELAY</p> <p> 50N I+&gt; INSTANTANEOUS EARTH-FAULT RELAY</p> <p> 50S I+&gt; DEFINITE TIME (ADJUSTABLE) CBCT OPERATED SENSITIVE EARTH FAULT RELAY</p> <p> 5 I&gt; INVERSE TIME OVER CURRENT RELAY</p> <p> 5IN I+&gt; INVERSE TIME EARTH FAULT RELAY</p> <p> 94 ANTI PUMPING RELAY</p> <p> 63 O BUCHHOLZ RELAY (ALARM &amp; TRIP)</p> <p> OTI OIL TEMP. INDICATOR (ALARM &amp; TRIP)</p> <p> WTI WINDING TEMP. INDICATOR (ALARM &amp; TRIP)</p> <p> PRD PRESSURE RELIEF DEVICE (TRIP)</p> <p> COL CONSERVATOR OIL LEVEL (ALARM)</p> <p> PSR PHASE SEQUENCE RELAY</p>							E
F	<p> TRANSFORMER</p> <p> HT CIRCUIT BREAKER (VCB)</p> <p> VOLTAGE TRANSFORMER</p> <p> VOLTAGE TRANSFORMER WITH 2 SECONDARY WINDING</p> <p> CURRENT TRANSFORMER</p> <p> DRAWOUT</p> <p> MFM MULTI FUNCTION METER</p> <p> AT CURRENT TRANSDUCER</p> <p> ASS AMMETER SELECTOR SWITCH</p> <p> (A) AMMETER</p> <p> 50 U&gt; OVER VOLTAGE RELAY</p> <p> 95 SUPERVISION RELAY</p> <p> 96 FUSE FAILURE RELAY</p> <p> ⊗ INDICATION LAMP</p> <p> ●—/→ EARTH SWITCH</p> <p> 80 DC FAILURE RELAY</p> <p> 86 DC FAILURE RELAY</p>							F
G	<p> 74 TRIP CIRCUIT RELAY</p> <p> 27 U&lt; UNDER VOLTAGE RELAY</p> <p> VSS VOLTMMETER SELECTOR SWITCH</p> <p> (V) VOLTMMETER</p> <p> HRC FUSE</p> <p> 30 ANNUNCIATOR RELAY</p> <p> 50 I&gt; INSTANTANEOUS OVER-CURRENT RELAY</p> <p> 50N I+&gt; INSTANTANEOUS EARTH-FAULT RELAY</p> <p> 50S I+&gt; DEFINITE TIME (ADJUSTABLE) CBCT OPERATED SENSITIVE EARTH FAULT RELAY</p> <p> 5 I&gt; INVERSE TIME OVER CURRENT RELAY</p> <p> 5IN I+&gt; INVERSE TIME EARTH FAULT RELAY</p> <p> 94 ANTI PUMPING RELAY</p> <p> 63 O BUCHHOLZ RELAY (ALARM &amp; TRIP)</p> <p> OTI OIL TEMP. INDICATOR (ALARM &amp; TRIP)</p> <p> WTI WINDING TEMP. INDICATOR (ALARM &amp; TRIP)</p> <p> PRD PRESSURE RELIEF DEVICE (TRIP)</p> <p> COL CONSERVATOR OIL LEVEL (ALARM)</p> <p> PSR PHASE SEQUENCE RELAY</p>							G
H	<p>CLIENT :- BALMER LAWRIE &amp; CO. LTD</p> <p>PROJECT :- MODERNISATION &amp; AUGMENTATION OF ELECTRICAL SYSTEM AT CFS, TRANSPORT DEPOT ROAD,KOLKATA-700088</p> <p>DRAWING NO :- BLC/CFS/KDL/A7-18/05</p> <p>DATE 17/05/2017</p> <p>DT- 17/05/17</p> <p>REV. NO. 0</p> <p>FIRST SUBMISSION</p> <p>DESCRIPTION</p>							H
							SCALE NTS	
							DATE 17/05/17	
1	2	3	4	5	6	7	8	