



**Securities and Exchange Board of India SEBI
Bhavan, Plot No. C-4A, 'G' Block, Bandra - Kurla
Complex, Bandra (E), Mumbai – 400051**

Tender No. FMD-IV/26/2019

**Tender Document – Part II
(Technical Bid)**

**Supply, Installation, Testing, Commissioning and
Maintenance of UPS at SEBI Bhavan II**

Tender submitted by

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General Terms and Conditions

1. Scope of Work:

The scope of work comprises of supply, installation, testing and commissioning of 2 nos. 200 KVA UPS for Data Center and 2 nos. 160 KVA UPS for Workstation/Facilities each with individual battery banks of SMF VRLA batteries with a back-up of 30 minutes(each UPS) at full load on unity power factor. The configuration for installation of UPS is as described below:

- (i) 2 nos. 200 KVA UPS are to be installed for Data Center application as dual feed redundant mode.
- (ii) 2 nos. 160 KVA UPS shall be in parallel online redundancy mode. The suitable bus and other accessories for making the system operate in online parallel redundant mode shall be part of this item. The UPS are to be installed for work stations, cabin computers, BMS system and hubroom applications etc.

All related electrical/ mechanical works such as mounting requirement, electrical wirings/ cables for interconnections, breakers, parallel bus system, connection of copper earth strip earthing to UPS, battery bank with battery mounting racks/ cabinets, safety features etc. between the provided main UPS supply panel and the outgoing UPS panel shall be under the scope of UPS works.

The work also includes the loading/unloading/unpacking, transportation and all such related works required for SITC of power distribution units (PDU).

Scope of work also include preventive, predictive and break down maintenance of UPS systems, battery banks and PDU for a period of at least five years after the completion of one year warranty period.

- 2. Tenderers shall submit the brochures/writeups in respect of models offered by them indicating the requisite technical specifications mentioned in Tender Document Part –II (Technical Bid).
- 3. Tender Document Part –II (Technical Bid) will be duly scrutinized by SEBI after opening. During scrutiny SEBI may seek additional informations/ documents from the participating tenderers to ascertain that they meet the required technical parameters.
- 4. The decision of SEBI in qualification of tenderers in Technical Bid will be final and binding.
- 5. The SITC shall be carried out with prior approval of officer-in-charge and if needed in presence of SEBI's representative and upto their satisfaction.

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6. The tenderer shall ensure that the SITC work is carried out without affecting the office works and with least disturbance to office staff. The works should be preferably carried out after office hours, Saturdays/Sundays or other holidays and with prior approval of officer in charge.
7. The damage caused, if any, by the tenderer to any equipment or SEBI's properties due to negligence at work shall be recovered from the tenderer from their bills or EMD as may be deemed fit.
8. The tenderer shall ensure the removal of waste, debris etc. and make good the place in previous condition after the completion of work.
9. All the tools, tackles including test bed/testing Load kit required for SITC of said works shall be arranged by the tenderer themselves.

10. Completion of SITC Works:

Completion of SITC works means SITC of UPS, battery banks, PDU complete in all respect duly acknowledged and taken over by SEBI officials or their authorized representative. The tenderer will submit the detailed test and installation report after completion of SITC works.

The Completion of SITC Works shall be within 8 weeks from the date of receipt of work order.

11. Agreement:

On receipt of work order from SEBI, the successful tenderer shall be bound to implement the contract and within fifteen days thereof, he shall sign an agreement on a non-judicial stamp paper of appropriate value (Five hundred rupees plus 0.1 percent of the amount above rupees ten lakh subject to maximum of rupees twenty five lakhs).

12. Performance Bank Guarantee (PBG):

- i. Bank Guarantee for an amount @10% of work order value towards SITC (i.e. cost of UPS, battery banks, PDU and related accessories) excluding CSMC charges valid till 6 years and 6 months from date of Completion of SITC Works issued by a Scheduled Bank as per the attached format in Annexure – II should be deposited as Performance Guarantee and has to be submitted by the successful tenderer within 15 days of completion of SITC works. The payments shall be released after submission of PBG.

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- ii. Performance Bank Guarantee will be released to the successful tenderer after successful completion of SITC works, their warranty period and subsequent CSMC period of 5 years and extension of CSMC period, if any.

13. Liquidated Damage (LD):

The liquidated damages against delay in Completion of SITC Works will be charged @ 0.5 % of work order value excluding CSMC charges (i.e. total cost of UPS, battery banks, PDU and related accessories) per week subject to a maximum of 10%. For the purpose of calculation of liquidated damages for delayed completion for any part of week will be considered as one complete week.

14. Warranty Period:

UPS and PDU Warranty

The UPS and PDU shall be under warranty against defects in design, specifications, workmanship and materials for **a period of one year from date of Completion of SITC works.**

Battery Warranty

SMF - VRLA batteries shall be under replacement warranty for a period of **3 years** from the date of completion of SITC Works.

15. CSMC Period:

All the UPS, PDU and related accessories will be covered under Comprehensive Service Maintenance Contract (CSMC) after the expiry of their respective warranty periods for a period of five years w.e.f. the next day after the date of expiry of warranty periods. However, the battery shall be replaced by SEBI as and when required after completion of battery warranty of 3 years as per existing ratings and in consultation with the successful tenderer.

16. Payment Terms:

The payment will be made to the successful tenderer only after submission of original bill along with requisite delivery challans, installation reports etc. duly acknowledged by SEBI representative only within a period of 21 days. The certification of bills would be strictly as per approved rates as per Bill of Quantities of Tender Document Part – III (Price Bid) which is inclusive of all taxes such as GST, Octroi, other Central or State Govt. taxes, transportation or labour charge, insurance etc. SEBI will not pay any amount over and above the approved rates.

Payment will be released to the tenderer as per the details given below:

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- i. 100% of the cost of UPS, batteries, PDU and related accessories against successful supply, installation and commissioning at SEBI's premises.
 - ii. The payments towards the cost of UPS, batteries, PDU and related accessories will be made through single bill. Part bill shall not be considered.
 - iii. Payment towards CSMC charges would be on quarterly basis at the end of every quarter subject to submission of original bills alongwith service reports.
17. Applicable taxes including labour cess would be deducted at source for which the tenderer would be issued necessary TDS certificate.
18. All the UPS and PDU and components should be brand new having been manufactured within 1 year of the date of supply at site. The documentary evidence such as certificate issued by Original Equipment Manufacturer (OEM) for the same needs to be submitted.
19. SEBI reserves the right to accept or reject any of the equipment offered by the tenderer in case of non-compliance as per desired specifications. The decision in this regard will be final and binding on the tenderers.
20. SEBI reserves the right to accept or reject the offered UPS models or any of features offered in the technical specification chart for which SEBI is not bound to assign any reason thereof.
21. The qualified tenderers in Technical Bid will only be considered for evaluation of Price Bid.
22. In case of any changes in technical specifications after the scrutiny of tenders received, all the tenderers will be allowed to submit revised Tender Document Part-III (Price Bid) as may be decided by SEBI.
23. Tenderer Document Part-III (Price Bid) of those tenderers who do not qualify the eligibility criteria, Technical Bid will not be opened. The same will also not be opened in case of non-receipt of requisite EMD along with Tender Document Part-I (Eligibility).
24. Tenders would be evaluated based on sum total of quoted amount for UPS alongwith batteries, PDU etc. and the rates quoted against CSMC charges.

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25. There will not be any rate escalation towards CSMC charges within the validity period of five years over the accepted/ approved CSMC charges under any circumstances. Tenderers should quote their rates accordingly.
26. Tenderers should quote their offered rates in Bill of Quantities of Tender Document Part-III (Price Bid) for the UPS System. The rates must be quoted suitably considering all provisions stipulated in the Tender Document.
27. The rates quoted in Bill of Quantities of Tender Document Part-III (Price Bid) against the price of UPS and PDU should be inclusive of all taxes and duties such as Good and Services Tax (GST), Octroi, other Central or State Govt. taxes, Import duty, transit, insurance till handing over, transportation or labour charges etc. Nothing extra shall be paid over and above the quoted amount.
28. With respect to Comprehensive Services Maintenance Contract (CSMC) charges, GST shall be paid as per prevailing rates at the time of billing.
29. The tenderer has to supply, install, test and commission the UPS and PDU at designated location (UPS: Upper Basement and PDU: 3rd floor) in SEBI Bhavan-II, Plot No. C-7 G Block Bandra-Kurla Complex, Bandra (E), Mumbai 400 051. The tenderers are requested to inspect the site before quoting the rates.
30. No cost incurred by the tenderer in applying, in providing necessary clarifications or attending discussion, conferences or site visits will be reimbursed by the SEBI.
31. SEBI reserves the right to increase/ decrease the quantity of procurement of UPS units as per requirement of the SEBI and the tenderer will be paid for final executed quantity as per the approved rates in the Bill of Quantities of the Tender Document Part –III (Price Bid) on pro-rata basis.
32. SEBI also reserves the right to delete any of the items mentioned in the Bill of Quantities.
33. SEBI reserves the right to reject any or all the tenders without assigning any reason thereof.
34. No tools and tackles either for unloading or for shifting the equipments for erection purposes would be made available by SEBI. The successful tenderer shall make his own arrangement for all these facilities.
35. The tenderer shall be responsible for the watch and ward and safety of the site /property/ material provided by him and materials issued by SEBI against pilferage and breakage of fire during the period of execution and thereafter till the work is completed and physically handed over to SEBI. The contractor should make their own arrangement for proper watch and ward at their risk and cost. No claim will be entertained on this account.

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36. Interpreting Specifications:

In the case of discrepancy between the Bill of Quantities, the technical Specifications and/ or the Drawings, the following order of preference shall be observed:-

- (i) Description of Bill of Quantities.
- (ii) Technical Specifications and Additional Conditions
- (iii) Indian Standard Specifications of B.I.S.
- (iv) Drawings, if any.

37. Inspection and testing:

Factory Test-

- (a) The UPS unit shall be tested at factory before delivery to check all the technical parameters as mentioned in Annexure I (A) and Annexure I (B) by the SEBI's Officer-in-charge or his representative. The boarding, loading and travel etc. of SEBI's Officer-in-charge or his representative will be arranged and borne by SEBI.

Testing at Site:

- (b) After completion of installation work in all respect, the tenderer shall make necessary arrangement for testing of individual UPS along with batteries on full load for the backup time specified for the individual UPS to check the adequacy of capacity of entire system, batteries before accepting the work. Load bank (Resistive) required for testing shall be arranged by the tenderer within quoted rates and nothing extra shall be paid.
- (c) The installation will be accepted by SEBI only after complying with observations of inspection team (if any) for the work executed by the tenderer under the agreement

38. The work shall be carried out in engineering like manner and bad workmanship shall be rejected summarily. For redoing the job, no claim of the tenderer shall be entertained on this account.

39. The tenderer shall ensure quality construction/fabrication/assembly in a planned and time bound manner. Any sub-standard material or work beyond set out tolerance limits shall be summarily rejected by the Engineer-in-charge.

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40. The tenderer will ensure that all the skilled persons managed / deployed for executing the electrical work possess requisite supervisory & wireman license issued by approved authorities.

41. The successful tenderer shall carry out SITC and maintenance works strictly as per applicable Electricity Act 2003, CEA (Measures relating to safety and electric supply) Regulation, 2010 and as amended up to date and other statutory provisions, if any, applicable in this respect. All safety rules/ precautions must be observed while carrying out such works.

42. Compliance with Regulations and Indian standards

(a) All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

- (i) Factories Act.
- (ii) Indian Electricity Rules.
- (iii) I.S. & B.S. Standards as applicable.
- (iv) Workmen's Compensation Act.
- (v) Statutory norms prescribed by local/statutory bodies.

(b) Nothing in this specification shall be construed to relieve the successful tenderer of his responsibility for the design, manufacture, installation, testing and commissioning of the equipment with all accessories in accordance with currently applicable statutory regulations and safety codes.

(c) Successful tenderer shall arrange for compliance with statutory provisions of safety regulations and departmental requirements of safety codes in respect of labour employed on the work by the tenderer.

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Other Terms and Conditions

1. There will be no separate agreement for CSMC with the tenderer. The terms and conditions as mentioned in the Tender Document shall be applicable and binding during warranty and CSMC periods.
2. The CSMC works shall be carried out by the successful tenderer directly. SEBI would not allow outsourcing of CSMC services works to any other party by tenderer.
3. Battery health of individual battery shall be checked quarterly basis during the entire warranty and CSMC period. However, Battery replacement shall be carried out by SEBI after warranty period in case of any battery defect is brought in notice to SEBI by the successful tenderer. However, the sole responsibility of maintaining the battery bank health in good condition shall be with the successful bidder.
4. Terms and conditions vis-à-vis warranty and CSMC period of the UPS, batteries, PDU and related accessories:
 - i. The successful tenderer shall carry out preventive maintenance of all the UPS, batteries, PDU and related accessories as per their manufacturer's recommendation and submit the services report during the warranty as well as CSMC period.
 - ii. The successful tenderer shall supply all spares, consumables etc. as and when required within the warranty and CSMC period free of cost. The CSMC charges are based on all other cost for maintenance of UPS, batteries, PDU and related accessories has to be borne by the tenderers.
 - iii. Defects in any spare parts at any stage during the warranty as well as CSMC period leading to abnormal performance will be replaced immediately by the successful tenderer.
 - iv. The successful tenderer shall ensure that the entire system is working satisfactorily and meets all relevant standards relating to performance/ defects in the UPS/PDU etc. and is up to the mark.
 - v. The complaint will be generally lodged on the contact telephones nos./ fax/ e-mail/ letters etc. as furnished by the tenderer in tender or any subsequent updates.

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- vi. In case of any defect in the normal functioning of the UPS, batteries, PDU and related accessories, it should be attended by the tenderer within **4 hours of lodging the complaint.**
 - vii. All the defective parts or consumables of the UPS, batteries, PDU and related accessories should be repaired/ replaced by the tenderer during the warranty as well as CSMC period within **24 hours of lodging the complaint.**
 - viii. If the spare parts or consumables are not replaced within a period of **24 hours of lodging the complaint** the tenderer should arrange standby UPS, batteries, PDU and related accessories of same model/make acceptable by SEBI officials within the said period of **24 hours of lodging the initial complaint.**
 - ix. In case of failure in attending the complaints within the stipulated time frame and resolving the complaints or providing standby UPS, batteries, PDU and related accessories as mentioned above in this section i.e. Sr. No. 4 (vi),(vii), (viii) of Other Terms and Conditions, an amount @ **Rs.800/- per day w.e.f. the time of lodging the complaint till the supply of standby UPS or repair of UPS subject to a ceiling limit of Rs.12,000/- for such UPS/ batteries/PDU** would be deducted from the CSMC charges of all UPS, batteries, PDU and related accessories payable to the party. If the complaint is not resolved to the entire satisfaction for more than 15 days from the date of lodging the complaint or recurring failures of any particular UPS/batteries/PDU, SEBI reserves the right to invoke the Performance Bank Guarantee. SEBI's decision in this regard will be final and binding on the successful tenderer.
 - x. The successful tenderer shall ensure that the maintenance of UPS, batteries, PDU and related accessories are carried out without affecting the office works and with least disturbance to the office staff.
5. The successful tenderer shall ensure that all the spare parts and consumables are readily available with them to ensure smooth functioning of the UPS, batteries, PDU and related accessories
6. The successful tenderer would provide their services and make available all spare parts or consumables if the UPS, batteries, PDU and related accessories are shifted to any other offices in Mumbai at no extra cost.

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7. Payment towards CSMC charges would be on quarterly basis after successful completion of every quarter subject to submission of bills alongwith service reports and the payment will be made as per approved rates as mentioned in the price Bid.
8. Any change in the GST rate vis-à-vis CSMC charges at later stage shall be paid as applicable to furnishing of necessary documentary evidence.
9. The service personnel / technician deputed at SEBI's premises for SITC and maintenance should bear their company's identification card and follow all security norms prevailing on SEBI's premises.

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Special Terms and Conditions

The technical specification chart as per Annexure I (A), I (B), I(C) and I (D) shall be filled by the tenderer mentioning the specific details of the offered UPS system. The same shall be scrutinized for technical qualification.

The list of approved makes of UPS, batteries and related items are mentioned in Annexure I (E).

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Technical Specifications for UPS System

1.1 General Characteristics

- (a) Online Double Conversion – Transformer less Design with 3 Level IGBT based Inverter Technology
- (b) Modular UPS with swappable Power Modules
- (c) Integrated Parallel capability
- (d) Up to four UPS sub-units for capacity
- (e) DSP (Digital Signal Processor) / Microprocessor based control, using IGBT devices and high switching frequency PWM
- (f) Top/Bottom cable entry as directed
- (g) Capability of independent battery bank operation of the UPS when operated in Parallel Redundant System

1.2 Design requirements:

- (i) 2 nos. 200 KVA UPS are to be installed for Data Center application as dual feed redundant mode.
- (ii) 2 nos. 160 KVA UPS shall be in parallel online redundancy mode. The suitable bus and other accessories for making the system operate in online parallel redundant mode shall be part of this item. The UPS are to be installed for work stations, cabin computers, BMS system and Hubroom applications etc.

Supply of independent Battery bank with battery mounting racks/cabinets having 30 minutes backup.

1.3 The UPS shall be designed in accordance with the applicable sections of the current revision of the following standards.

Subject	Standard Reference	Standard Title
Safety	IEC/EN 62040-1	Uninterruptible power systems (UPS) – Part 1: General and safety requirements for UPS
Electromagnetic Compatibility (EMC)	IEC/EN 62040-2	Uninterruptible power systems (UPS) – Part 2: Electromagnetic Compatibility (EMC) requirements
Performance	IEC/EN 62040-3	UPS – part 3: Method of specifying the performance and test requirements
Environmental	IEC 62040-4: 2013-04	1st edition Uninterruptible Power Systems (UPS) - Part 4: Environmental aspects – Requirements and reporting

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1.4 Mode of operation

The UPS shall be designed to operate as double conversion true ON LINE VFI as per “**Uninterruptible Power Systems (UPS)** IEC 62040-1-1/ IEC 62040-2/ IEC 62040-3”:

- (a) Normal – The critical AC (alternating current) load is continuously supplied by the UPS inverter. The Rectifier/charger derives power from AC input source and supplies DC power to the inverter while simultaneously charging power reserve battery.
- (b) Emergency – Upon failure of AC input power, the critical AC load is supplied by the inverter, which without any switching (mains/DG Supply) obtains power from the battery. There shall be no interruption in power to the critical load upon failure or restoration of the AC input source.
- (c) Recharge – Upon restoration of AC input power during the emergency mode of operation, the rectifier/charger shall automatically restart, walk in and gradually assume the inverter and battery recharge loads.
- (d) Bypass – UPS must have for static bypass switch in addition to manually operated maintenance bypass switch. Manual switch should be incorporated into UPS cabinet that will connect the load to AC power source bypassing the rectifier/charger, inverter and static transfer switch.

Each static bypass transfer switch shall have the following overload characteristics:

- (i) 150% of UPS output rating for one (1) minute.
 - (ii) 125% of UPS output rating for 10 minutes
- (e) Off-Battery – If the battery system only is taken out of service for maintenance, it is disconnected from the rectifier/charger and inverters by means of (an) external disconnect breaker(s). The UPS shall continue to function and meet all of the specified steady state performance criteria, except for the power outage back-up time capability.
- (f) SNMP & Modbus Card– SNMP & Modbus cards shall be provided with UPS System

1.5 Battery Requirements

Battery banks connected to UPS shall be designed to provide at **least 30 minutes** back-up at full load for each individual UPS. The UPS module should be

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automatically disconnected when the battery reaches to the set minimum discharge voltage level or when signaled by other control functions. The tenderer shall provide detailed calculation sheets in support of the battery selection.

1.6 UPS Delivery Submittals

The specified UPS shall be supplied with one (1) user manual to include details of:

- (a) Functional description of the equipment with block diagrams.
- (b) Detailed installation drawings, including all terminal locations for power and control connections for both the UPS and battery system.
- (c) Safety precaution.
- (d) Step-by-step operating procedures.
- (e) General maintenance guidelines
- (f) The UPS shall be supplied with a record of pre-shipment final factory test report.

2.0 Product

2.1 Fabrication

2.1.1 Materials

UPS shall be brand new and shall not have manufacturing date earlier than one year from date of supply at site. In case of batteries manufacturing date shall not be more than 3 months (Documentary evidence for same needs to be submitted). Metal part shall be hot dipped galvanized / painted properly.

2.1.2 Construction and Mounting

The UPS unit should comprise of rectifier/charger, inverter, static transfer switch, maintenance bypass switch, and static bypass input switch housed in a free-standing sheet steel enclosure with key-lockable doors. Also, switch gears to be provided at input, output, static bypass & maintenance bypass of UPS. Front access only is required for servicing, adjustments, and installation. The enclosure should be built to comply with IP20. The UPS cabinet should be cleaned, primed, and painted with the manufacturer's standard colour complying seven tank process.

Each sub assembly should be of **25 KVA to 50 KVA** power modules.

2.1.3 Cooling

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Cooling of the UPS shall be by forced air ventilation. Variable speed fans should be used. Temperature shall be monitored by thermal sensors.

2.1.4 Cable Entry

Standard cable entry for the UPS module shall be from the top/bottom as required through detachable gland plate in separate cable alleys.

2.1.6 VRLA Battery

Battery racks shall be fabricated through MS painted metal. Tenderer will submit design of Battery racks before final fabrication. Battery rack shall be fabricated after approval of SEBI. Battery calculation details shall be submitted to SEBI.

2.1.7 System Control & Indication

Front Panel Colour Touch Graphical Display: The UPS control panel shall provide a touch colour graphic display for indication of UPS status, metering, battery status, alarm/event log, and advanced operational features.

- a. **Access:** The display shall provide access to:
 - Mimic diagram indicating UPS power flow.
 - Measurements, status indications, and events.
 - Event log with time stamping.
- b. **System parameters monitored:** The visual display shall include, but shall not be limited to, the following system parameters based on true RMS metering:

Measurements:

- (i) Input voltage (Ph-Ph and Ph-N) & Frequency
- (ii) Input current per phase.
- (iii) Bypass voltage.
- (iv) Bypass input frequency.
- (v) UPS output voltage (Ph-Ph and Ph-N) & Freq
- (vi) UPS output current per phase.
- (vii) UPS output frequency.
- (viii) UPS output percent load.
- (ix) UPS output kVA.
- (x) UPS output power factor.
- (xi) Battery Bank voltage.
- (xii) Battery Bank current.
- (xiii) Battery Charging Capacity

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c. Status indications and events:

- (i) Main Input Abnormal.
- (ii) Main Input Voltage Abnormal.
- (iii) Main Input Frequency Abnormal.
- (iv) Main Input Phase Sequence Fault.
- (v) Bypass Input Voltage Abnormal.
- (vi) Bypass Input Frequency Abnormal.
- (vii) Bypass Input Phase Sequence Fault.
- (viii) System General Fault.
- (ix) Battery Low warning.
- (x) Low Battery Cut Off.
- (xi) Parallel Communication Abnormal.
- (xii) Emergency Power Off.

- d. Time-stamped historical events:** The display unit will allow the user to display time and date stamped log of the 9999 most recent status and alarm events.

2.1.7. Communication Interface:

Communication interface provides the following communication ports which can be used simultaneously:

1. RS232 Serial Port.
2. USB Port.
3. Parallel port.
4. Input and output dry contacts.
5. RS485.
6. Network Port.

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Technical Specification for Power Distribution Unit (PDU)

1. SCOPE

The PDU is designed primarily for distribution, monitoring and isolation of electrical power for sensitive electronic loads in data center etc.

2. APPLICABLE STANDARDS, AGENCY APPROVAL AND REFERENCES

The following standards and documents apply to the specified equipment to the extent defined herein:

- a. IEC 60947-2 for MCCB
- b. IS/IEC 60898 for MCB
- c. NEMA TYPE 1 Panel –Enclosure
- d. NEMA TYPE-1 - Energy Efficiency for Distribution Transformers
- e. ISO 9001 - International Organization for Standardization

3. SYSTEM DESCRIPTION AND OPERATION

3.1 Normal Operation

Under normal operation the input power is routed through the Main Input Circuit Breaker which applies and disconnects AC power to the unit and protects the system in the event of a power overload. Power is directed to the isolation transformer (NEMA TP-1 Standard) where it will be electrically isolated on the output side of transformer.

A monitoring system placed on the input as well as output of the transformer will monitor the input and output power and trigger an alarm in the event of a power quality deviation. Output power is fed to the respective panel boards and / or distribution breakers to distribute power to specific loads. Load circuits can be controlled manually from distribution panel boards and individual distribution breaker power/energy can be monitored.

3.2 Emergency Operation

An Emergency Power Off (EFO) switch shall be provided. This shall be to prevent accidental operation. The local EPO shall include a covered "Emergency Power Off" push button. Pressing the EPO switch shall immediately shut down the unit by activating the shunt trip of the main input circuit breaker.

4. REQUIREMENTS AND PERFORMANCE CHARACTERISTICS

4.1 Input power Characteristics

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The Power rating of the PDU shall be 200 KVA (Nominal). The input voltage of the PDU shall be 415 VAC, 3 Phase.

4.2 Output power Characteristics

Nominal Output Voltage: - 230 V/ 415 V,
Nominal Output Frequency: - 50 Hz.

5. FUNCTIONAL DESCRIPTION

5.1 Main Input Circuit Breaker

The PDU shall be equipped with a main input MCCB which, when closed and fed by a voltage source, energizes the PDU.

5.2 Power Monitoring

The PDU will include a standard Circuit Monitor system monitor for metering and display of the PDU output parameters. The monitor shall display the output / load side voltage, current, kVA, kW and frequency and other parameters. All measured values will be displayed on a large format LCD display mounted on the front of PDU. The meter shall also be equipped with LED alarm status indication.

5.3 Metering (Standard MCM)

All metered values will be in "true RMS" values with 1.0% accuracy. The monitor shall include a keypad / touch screen allowing for the viewing of different selected values. The monitor shall display the following values and alarm conditions:

Data Output in Display for Input Breaker

The local display monitoring system shall monitor and display all of the following parameters:

- Output kWh Energy Consumption
- Output kW Real Power
- Output kVA Apparent Power
- Output Power Factor
- Input Voltage, L-L, for all 3 phases
- Output Voltage, L-L, for all 3 phases
- Output Voltage, L-N, for all 3 phases
- Output Voltage Total Harmonic Distortion (THD) for all three phases
- Output Current, for all 3 phases, N & G
- Output Current Total Harmonic Distortion (THD) all three phases
- Output Current Crest Factor (Peak/RMS) for all three phases
- Output K-Factor for all three phases
- Output Frequency
- Output Load%

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- Time and Date

Alarms in Display for Input Breaker

- Output Over Voltage
- Output Under Voltage
- Output Over Current
- Neutral Overcurrent
- Ground Overcurrent
- Output Voltage Distortion (THD)
- Output Overload
- Frequency Deviation
- Transformer Overtemp
- Phase Sequence Error

Data Output in Display for each branch Breaker

Current, Load%, KW, KW-Hrs

Alarms in Display for each branch Breaker

Branch Circuits: Over Current levels, Low Current.

5.4 Controls and Communications

The user shall be able to monitor with the PDU via the following interfaces:

- a) Emergency Power Off button that when activated shall trip the AC input circuit breaker with shunt trip.
- b) Audible Alarm "Test/Silence" push-button
- c) RS232, RS485 Monitoring.

5.5 Main Isolation Transformer

The main isolation transformer is provided as a standard feature. The output rating of the transformer shall be the same as the continuous duty maximum full load rating of the PDU. The isolation transformer is a Dry Type Isolation transformer with 200% rated neutral. The transformer is a three-wire DELTA connected 415 VAC input winding and four-wire 415 VAC output winding. The isolation transformer characteristics are described below:

- a. **NEMA TP-1 - Energy Efficient Distribution Transformers**
- b. **K-Factor:** K-13
- c. **Rating:** 200 KVA
- d. **Windings:** Copper
- e. **Harmonic Distortion:** less than 1%
- f. **Efficiency:** 98%
- g. **Insulation:** Class H
- h. **Temp Rise:** 180°C winding temperature rise
- i. **Impedance:** 4-5% at rated load
- j. **Ventilation:** Forced Air Cooling

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6. Grounding

- a. **Connections:** The following points should be connected to ground:
- a. Isolation transformer neutral
 - b. Isolation transformer shields and core

7. MECHANICAL DESIGN

7.1 Enclosure

The PDU will be housed in a free standing NEMA-1 enclosure. The PDU shall accommodate top/bottom entry cables. The system monitor panel, input and output circuit breakers, and all customer power and control connection points will be accessible from the front or side of the PDU.

7.2 Access

The system monitor panel, input and output circuit breakers, and all customer power and control connection points shall be accessible from the front of the PDU. Transformer service, tap changes, and CT replacement are specifically excluded. Output circuit breakers are protected with swinging, removable "dead front" panels. The doors shall be provided with a latched door lock (keyed lock optional).

7.3 Lifting

The PDU shall be designed and provided with suitable lifting lugs.

7.4 Dimension, Ventilation & Heat Rejection

The PDU size should be sufficient to accommodate all desired switches and control. It will be convection cooled. Air access shall be from the bottom and exhausts from the top. The PDU will have Cooling Fan and suitable number fans will be redundant. The PDU shall be vermin proof.

7.4 Power Wiring

All internal wiring shall be stranded copper with PVC or Nyvin, Neoprene or Silicon insulation with a minimum operating voltage of 600 volts RMS. Minimum insulation temperature rating shall be no less than 105 degree Centigrade, and in no case is less than that required by the location/application of the wiring.

7.5 Control Wiring

All control and instrumentation wiring used in this application shall be stranded copper with a temperature rating of at least 75 degree Centigrade and minimum 2.5 sq. mm conductor dia.

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Annexure – I (A)

Technical Specification Chart for 200 KVA UPS (to be confirmed / filled by the tenderer)

Sl. No.		Description	Required Parameters	To be specified by tenderer
		Capacity	200 KVA Modular construction	
		Make	-----	
		Model	-----	
(I)		Input available power quality		
	1	Voltage	415V±15% (3Ø, 4 Wire)	
	2	Frequency	50± 3 Hz	
	3	Power Factor	>0.99	
(II)		Output		
	1	Voltage	415V ±1% of Nominal setting at output side)	
	2	Frequency	50 Hz	
	3	Power Factor	Unity	
	4	Voltage Variation:		
		- <i>Static Balanced Load</i>	±1%	
		- <i>Static 100% Unbalanced Load</i>	±5%	
		- <i>Dynamic 100% Step Load</i>	±5%	
	5	Voltage Distortion	<3%	

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	6	Phase Displacement:		
		- <i>Balanced Load</i>	120° ±1°	
		- <i>100% Unbalanced Load</i>	120° ±3°	
	7	Frequency Variation (in Free- running mode)	±0.1 Hz	
	8	Synchronization Window	Upto 3Hz	
	9	Slew Rate	1Hz/ sec	
	10	Efficiency in Double conversion Mode	>95% for 25% to 100% load	
	11	Crest Factor	3:1	
	12	Number of Systems that can be paralleled	4	
(III)		DC Link		
	1	Battery Voltage	As per OEM	
	2	Low Battery Cut-off	10.5 V	
		Static By-pass		
	1	Overload	125% for 10 min 150% for 1 min	
	2	Switching Time:		
	(i)	Inverter to By-pass:		
		(a) <i>Inverter Overload</i>	< 2 ms	
		(b) <i>Inverter Failure</i>	<2 ms	
		(c) <i>Manual Command</i>	<2 ms	

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	(ii)	By-pass to Inverter (Auto and Manual modes)	<2ms	
(IV)		Battery Charger		
	4	Battery Charging voltage	As per OEM/OEA	
(V)		Protections		
	1	Input Voltage	REQUIRED	YES/NO
	2	Output Voltage	REQUIRED	YES/NO
	3	Over Temperature	REQUIRED	YES/NO
	4	Battery Over-charging	REQUIRED	YES/NO
	5	Battery Over-temperature	REQUIRED	YES/NO
	6	Output Over-load	REQUIRED	YES/NO
(VI)		Man Machine Interface		
	1	Front Panel Touch Screen Display	REQUIRED	YES/NO
	(i)	Displayed Parameters:		
	(a)	Input Voltage (for each Phase)	REQUIRED	YES/NO
	(b)	Input Current (for each Phase)	REQUIRED	YES/NO
	(c)	Output Voltage (for each Phase)	REQUIRED	YES/NO
	(d)	Output Current (for each Phase)	REQUIRED	YES/NO
	(e)	Battery Voltage	REQUIRED	YES/NO
	(f)	Battery Current	REQUIRED	YES/NO
	(g)	Output Frequency	REQUIRED	YES/NO

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	(h)	<i>Input Frequency</i>	REQUIRED	YES/NO
		<i>Displayed UPS Status:</i>		
	(a)	<i>Converter/ Rectifier- ON/ OFF</i>	REQUIRED	YES/NO
	(b)	<i>Inverter- ON/OFF</i>	REQUIRED	YES/NO
	(c)	<i>Static Switch - On Mains/Inverter</i>	REQUIRED	YES/NO
	(d)	<i>Load- Within Limit/ Over-load</i>	REQUIRED	YES/NO
	(e)	<i>Battery - On Float/ Boost /Discharging</i>	REQUIRED	YES/NO
	2	Fault Alarm/ Buzzer	REQUIRED	YES/NO
	3	Networking & Monitoring	REQUIRED	YES/NO
	(i)	USB Port for Communication with Stand-alone PC	REQUIRED	YES/NO
	(ii)	Port for Communicating via Local &/or Global Network- LAN/ WAN	REQUIRED	YES/NO
	(iii)	System Fault Monitoring Capacity- Min. 9999 Events	REQUIRED	YES/NO
(VII)	2	Physical Parameters		
		Dimensions (H x W x D)	As per OEM/ OEA	
(VIII)		Batteries for UPS	VRLA	
	1	Make	-----	
	2	Ah rating	-----	

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	3	Power Backup in Minutes	30 minutes each UPS at full load on unity power factor	
	4	Numbers	As per design	

Note: -

The UPS offered should be compatible with Lithium Ion batteries.

The UPS should be modular construction, in case of failure of one module, the remaining modules should be catering the load.

Battery Calculation sheet for deriving 30 minutes power backup at full load for 200KVA UPS is to be attached

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Annexure – I (B)

Technical Specification Chart for 160 KVA UPS (to be confirmed / filled by the tenderer)

Sl. No.		Description	Required Parameters	To be specified by tenderer
		Capacity	160 KVA Modular construction	
		Make	-----	
		Model	-----	
(I)		Input available power quality		
	1	Voltage	415V±15% (3Ø, 4 Wire)	
	2	Frequency	50± 5 Hz	
	3	Power Factor	>0.99	
(II)		Output		
	1	Voltage	415V ±3% of Nominal setting at output side)	
	2	Frequency	50 Hz	
	3	Power Factor	Unity	
	4	Voltage Variation:		
		- <i>Static Balanced Load</i>	±1%	
		- <i>Static 100% Unbalanced Load</i>	±5%	
		- <i>Dynamic 100% Step Load</i>	±5%	
	5	Voltage Distortion	<3%	
	6	Phase Displacement:		
		- <i>Balanced Load</i>	120° ±1°	

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		-100% Unbalanced Load	120° ±3°	
	7	Frequency Variation (in Free- running mode)	±0.1 Hz	
	8	Synchronization Window	Upto 3Hz	
	9	Slew Rate	1Hz/ sec	
	10	Efficiency in Double conversion Mode	>95% for 25% to 100% load	
	11	Crest Factor	3:1	
	12	Number of Systems that can be paralleled	4	
(III)		DC Link		
	1	Battery Voltage	As per OEM	
	2	Low Battery Cut-off	10.5 V	
		Static By-pass		
	1	Overload	125% for 10 min 150% for 1 min	
	2	Switching Time:		
	(i)	Inverter to By-pass:		
		(a) Inverter Overload	< 2 ms	
		(b) Inverter Failure	<2 ms	
		(c) Manual Command	<2 ms	
	(ii)	By-pass to Inverter (Auto and Manual modes)	<2ms	
(IV)		Battery Charger		

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	4	Battery Charging voltage	As per OEM/OEA	
(V)		Protections		
	1	Input Voltage	REQUIRED	YES/NO
	2	Output Voltage	REQUIRED	YES/NO
	3	Over Temperature	REQUIRED	YES/NO
	4	Battery Over-charging	REQUIRED	YES/NO
	5	Battery Over-temperature	REQUIRED	YES/NO
	6	Output Over-load	REQUIRED	YES/NO
(VI)		Man Machine Interface		
	1	Front Panel Touch Screen Display	REQUIRED	YES/NO
	(i)	Displayed Parameters:		
	(a)	<i>Input Voltage (for each Phase)</i>	REQUIRED	YES/NO
	(b)	<i>Input Current (for each Phase)</i>	REQUIRED	YES/NO
	(c)	<i>Output Voltage (for each Phase)</i>	REQUIRED	YES/NO
	(d)	<i>Output Current (for each Phase)</i>	REQUIRED	YES/NO
	(e)	<i>Battery Voltage</i>	REQUIRED	YES/NO
	(f)	<i>Battery Current</i>	REQUIRED	YES/NO
	(g)	<i>Output Frequency</i>	REQUIRED	YES/NO
	(h)	<i>Input Frequency</i>	REQUIRED	YES/NO
		<i>Displayed UPS Status:</i>		
	(a)	<i>Converter/ Rectifier-ON/ OFF</i>	REQUIRED	YES/NO

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	(b)	<i>Inverter- ON/OFF</i>	REQUIRED	YES/NO
	(c)	<i>Static Switch - On Mains/Inverter</i>	REQUIRED	YES/NO
	(d)	<i>Load- Within Limit/ Over-load</i>	REQUIRED	YES/NO
	(e)	<i>Battery - On Float/ Boost /Discharging</i>	REQUIRED	YES/NO
	2	Fault Alarm/ Buzzer	REQUIRED	YES/NO
	3	Networking & Monitoring Interface:	REQUIRED	YES/NO
	(i)	USB Port for Communication with Stand-alone PC	REQUIRED	YES/NO
	(ii)	Port for Communicating via Local &/or Global Network- LAN/ WAN	REQUIRED	YES/NO
	(iii)	System Fault Monitoring Capacity- Min. 9999 Events	REQUIRED	YES/NO
(VII)	2	Physical Parameters		
		Dimensions (H x W x D)	As per OEM/ OEA	
(VIII)		Batteries for UPS	VRLA	
	1	Make	-----	
	2	Ah rating	-----	

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	3	Power Backup in Minutes	30 minutes each UPS at full load on unity power factor	
	4	Numbers	As per design	

Note: -

The UPS offered should be compatible with Lithium Ion batteries in future.

The UPS should be modular construction, in case of failure of one module, the remaining modules should be catering the load.

Battery Calculation sheet for deriving 30 minutes at full load power backup for the 160 KVA UPS is to be attached.

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Annexure – I (C)

Technical Specification chart for SMF VRLA batteries for 200KVA and 160 KVA UPS to be confirmed / filled by the tenderer

Note: Battery Calculation sheet clearly mentioning the no. of batteries, its rating etc. so as to provide 30 mins. Back up for each individual UPS at full load (at unity p.f.) is to be submitted on separate sheet duly stamped and sig

Sr. No.	Parameters	Requirement as per specification	To be specified by tenderer
1	Make	To be given by bidder	
2	Model	To be given by bidder	
(i)	For 200 KVA UPS	-----	
(ii)	For 160 KVA UPS	-----	
3	Capacity (in Ah)	As per back up requirement of 30 min with unity power factor	
(i)	For 200 KVA UPS	-----	
(ii)	For 160 KVA UPS	-----	
4	Type	VRLA	
5	Nominal Voltage	12V	
6	Power Factor	Unity	
7	Container Design	Fire / Flame retarded type plastic Enclosure (FR / FRP)	
8	Battery Cabinet Dimensions (W*H*D)	To be given by bidder	
(i)	For 200 KVA UPS	-----	
(ii)	For 160 KVA UPS	-----	
9	Compliance	Batteries shall be supplied from ISO 9001: QS9000 and ISO 14001 accredited manufacturers	Yes/No
10	Standard	Wherever it is not specified and contention arises standards IEC 60896-2 , 60896 – 21 and 60896 – 22 shall be followed	Yes/No

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Annexure – I (D)

Technical Specification chart for 200 KVA Power Distribution Unit (to be confirmed / filled by the tenderer)

Sl. No.	Description	Requirement as per specification	To be specified by tenderer
	Capacity	200 KVA	
	Make		
	Model		
1	Input Parameters		
i)	Voltage	400 $\pm$ 10 %, Three Phase, AC	
ii)	Frequency	50Hz $\pm$ 5 %	
iii)	Numbers of Wires	4 (R, Y, B, N)	
2	Output		
i)	Voltage	Same as Input	
ii)	Frequency	Same as Input	
iii)	Numbers of Wires	4 (R, Y, B, N)	
3	Isolation Transformer		
i)	Configuration	Three Phase, Delta / Star	
ii)	Primary/Secondary	400V / 400V $\pm$ 15%	
iii)	Winding conductor	Cu	
iv)	"K" rating	K-13	
v)	Transformer insulation class	Class-H	
vi)	Efficiency at 50% Loading	$\geq$ 98%	

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5	Transient Surge Protection	Required	
6	Manual Soft Start	Required	
7	Branch Circuit Monitoring	Required	
8	Display/Metering		
i)	Indication Lamps	Input & Output R, Y, B (6 Nos.)	
ii)	Meter	Multifunction Meter suitable for reading V, I, KVA, KW, KWH & THD.	
iii)	Fan Failure Indication	Required	
iv)	BCM/Meter to BMS Connectivity protocol	MODBUS / TCP IP through RS-485 Port	
9	Mechanical Characteristics		
iii)	Protection grade	IP20	
iv)	Dimensions	To be specified	
v)	Bottom Stand	Required	

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Annexure – I (E)

Approved Makes

Sr. No.	Description	Make
1.	UPS	Vertiv / Schnieder Electric/ Delta/ Eaton(Powerware)/ Numeric(LeGrand)
2.	PDU	Vertiv/ Schnieder Electric /Rittal/ Delta/ Numeric(LeGrand)
3.	Moulded Case Circuit Breakers/MCBs	LeGrand/ L & T/ Hager/ Siemens/ Schnieder
4.	VRLA Battery	Exide/ Amar Raja (Quanta)
5.	Surge Protection Device	Emerson/ Indelec/ Tarcel
6	Isolation Transformer in PDU	Servomax/ Datsun/ Elmax

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Annexure – II

Format of Bank Guarantee

In consideration of the Securities and Exchange Board of India (hereinafter referred to as "SEBI ") having offered to accept the terms and conditions of the proposed agreement between the SEBI and (hereinafter referred to as "said Tenderer") for the work

(Hereinafter referred to as "said agreement") having agreed to production of irrevocable Bank Guarantee for Rs. (Rupeesonly) as security / guarantee from the said tenderer for compliance of his obligations in accordance with the terms and conditions in the said agreement.

1. We (hereinafter referred to as "the Bank") hereby (Indicate the name of the Bank) undertake to pay to SEBI an amount not exceeding Rs..... (Rupees.....only) on demand by SEBI.
2. We, the Bank do hereby under take to pay to SEBI on demand the amount due and payable under this Guarantee without any demure and merely on demand by SEBI stating that the amount claimed is due from the said tenderer. Any such demand made to the Bank shall be conclusive as regard to the amount due and payable by the bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. (Rupees.only)
3. We, the bank further undertake to pay to SEBI any money so demanded notwithstanding any dispute raised by the tenderer in any suit or proceeding pending before any court or Tribunal relating thereto, and our liability under this guarantee being absolute and unequivocal.

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4. The payment so made by us under this guarantee shall be a valid discharge of our liability for payment therein under and the said tenderer shall have no claim against us for making such payment.
5. We, the Bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of SEBI under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till authorized Officer on behalf of SEBI certifies in writing that the terms and conditions of the said agreement have been fully and properly carried out by the said tenderer and accordingly the guarantee will be discharged.
6. We, the Bank further agree with SEBI that SEBI shall have the fullest liberty without our consent and without effecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance of the said tenderer from time to time or to postpone for any time or from time to time any of the powers exercisable by SEBI against the said tenderer and to forebear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said tenderer or for any forbearance, act or omission on the part of SEBI or any indulgence by SEBI to the said tenderer or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.
7. This guarantee will not be discharged due to the change in the constitution of the Bank or the said tenderer.
8. We, the bank lastly undertake not to revoke this Guarantee except with the previous consent of SEBI.
9. This guarantee shall be valid up to.unless extended on demand by SEBI Notwithstanding anything mentioned above, our liabilities against this

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guarantee is restricted to Rs./-(Rupeesonly) and unless a claim in writing is lodged with us within nine months of the date of expiry or extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

10. Notwithstanding anything contained herein:-

- a. Our liability under this Bank Guarantee shall not exceed Rs.....
(Rupees Only).
- b. This Bank Guarantee shall be valid upto.....
- c. We are liable to pay the Guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before..... All the rights of the beneficiary under the said Guarantee shall be forfeited and Guarantee shall be released and discharged from all liabilities thereafter.

The Bank has under its constitution, power to give this Guarantee in your favour made under our Memorandum and Articles of Association and Mr/Mrs.....who signed it on behalf of the Bank has the authority to do so.

Dated this theday of for
.....(indicate the name of bank)

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