TENDER ID: BHO202007005

SBI INFRA MANAGEMENT SOLUTIONS PVT. LTD.(SBIIMS),
(WHOLLY OWNED SUBSIDIARY OF SBI)
BHPAL CIRCLE OFFICE

TENDER FOR SUPPLY AND INSTALLATION OF UPS SYSTEMS WITH SMF BATTERIES FOR BRANCHES/OFFICES LOCATED IN MADHYA PRADESH & CHHATTISGARH
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NOTICE INVITING TENDER (NIT)

On behalf of State Bank of India, Local Head Office, BHOPAL, Request for proposals (RFP) are invited by SBI INFRA MANAGEMENT SOLUTIONS Pvt. Ltd. (hereinafter referred to as SBIIMS), in two Bids system (Technical Bid and Price Bid) from empaneled vendors with State Bank of India who receive the NITs through mail for Supply and Installation of UPS systems with Batteries at Branches/Offices of State Bank of India in Madhya Pradesh & Chhattisgarh state. e-Tendering (Price Bid) will be conducted as per requirement of State Bank of India through SBI Service provider M/s e-procurement Technologies Pvt. Ltd, Ahmedabad amongst the vendors, who qualified in Technical Bid as specified in the tender document as under :-

<table>
<thead>
<tr>
<th></th>
<th>Name of Work and location of work</th>
<th>Supply and Installation of UPS systems with Batteries at Branches/Offices of State Bank of India in Madhya Pradesh &amp; Chhattisgarh state</th>
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<tbody>
<tr>
<td>2</td>
<td>User Department</td>
<td>Premises &amp; Estate Department, State Bank of India, Local Head Office, Hoshangabad Road, Opposite Maida mill, Bhopal (Madhya Pradesh)-462011</td>
</tr>
<tr>
<td>3</td>
<td>Availability of Tender documents</td>
<td>Tender documents can be downloaded from the Bank’s website <a href="http://www.sbi.co.in">www.sbi.co.in</a> under section “Procurement news’ from 09.07.2020 to 30.07.2020</td>
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<td>4</td>
<td>Technical Bid</td>
<td>The NIT-Technical Bid (Hard copy) along with Annexure: I, II &amp; III with all supporting documents should be submitted in a sealed cover containing the name and complete address/contract number of the vendor on the cover and bear the title “Technical Bid Supply and Installation of UPS systems with SMF Batteries for Branches/Offices located in Madhya Pradesh &amp; Chhattisgarh state” addressed to the Vice President &amp; Circle Head, SBIIMSPL, Circle office, BHOPAL Mezzanine floor, State Bank of India, Local Head Office Building, BHOPAL-462011 in the “TENDER BOX” kept at Mezzanine floor, State Bank of India, Local Head Office Building, Bhopal on or before 30.07.2020 upto 02:00PM along with the followings:</td>
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<tr>
<td></td>
<td>Tender Application Fee</td>
<td>amounting to ₹3,000.00 (Rupees Three thousand only) (Non- Refundable) will be paid by the Bidders only through State Bank Collect (SB Collect an efficient MIS report generating tool). The steps involved in making the payment is provided below. The receipt generated with Reference No. will be submitted along with EMD as a proof for payment.</td>
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<td></td>
<td>Earnest Money Deposit (EMD)</td>
<td>amounting to ₹25,000.00 (Rupees Twenty five thousand only) to be deposited to in the form of Demand Draft along with technical bid and drawn in favor of “AGM (P&amp;E), State Bank of India” payable at Bhopal.</td>
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<tr>
<td><strong>Date and Time of opening of Technical Bids</strong>: &lt;br&gt; <strong>On Date:</strong> <strong>30.07.2020 &amp; Time:</strong> <strong>03:30 P.M.</strong></td>
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<td>Authorized representatives of vendors having authorization letter issued by the company may be present during opening of the Technical Bids. However, Technical Bids would be opened even in the absence of any or all of the vendor’s representatives.</td>
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<td>After opening, the Technical Bids will be evaluated including deposit of specified amounts for the Tender Processing Fee and Earnest Money as mentioned above.</td>
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<td><strong>5</strong></td>
<td><strong>Price Bid</strong></td>
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<td>The Price Bid will be through e-tendering amongst the bidders who qualifies in Technical Bid and deposited the specified amounts towards Tender Processing Fee and Earnest Money Deposit (EMD) through SBI Service Provider M/s e-procurement Technologies Pvt. Ltd, Ahmedabad for finalization of rate for a period of One year for the Branches/offices. The price bid will not be submitted in hard copy. Date and time for submission and opening of price bid (<a href="https://etender.sbi/">https://etender.sbi/</a>) through e-Tendering will be intimated to the qualified contractors separately through SBI service provider M/s E-Procurement Technologies Pvt. Ltd., Ahmedabad after scrutiny of their Technical bid. The bidder should have valid digital signature for participation in e-Tendering.</td>
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<td><strong>6</strong></td>
<td><strong>Validity of NIT</strong></td>
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<td>NIT shall remain valid for acceptance for a period of 3 (Three) months from the date of e-Tendering for price bid. If the Bidders withdraw their offer during the validity period or makes modifications in his/her original offer which are not acceptance to SBIIMSPL without prejudice to any other right or remedy, SBIIMSPL shall be at liberty to forfeit the EMD.</td>
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<td><strong>7</strong></td>
<td><strong>Contact details for any clarification</strong></td>
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<td>The Vice President &amp; Circle Head, SBI Infra Management Solutions Pvt. Ltd. Circle office, Bhopal, Mezzanine floor, SBI LHO Building, Hoshangabad Road, Bhopal-462011</td>
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<tr>
<td><strong>8</strong></td>
<td><strong>Contact details for any E-tendering related queries</strong></td>
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<tr>
<td><strong>Service provider:</strong> M/s e-Procurement Technologies Ltd., (Procure Tiger) A-201, Wall Street-II, Opp. Orient Club, Near Gujarat College, Ahmedabad-380006, Gujarat State, India Tel.: PH Nos.: +9179-681368 40/31/35/63/29/57/53/43/52/20/59/22, Mobile No.: 908100427/99044079/6386155829 Email: <a href="mailto:sujith@auctiontiger.net">sujith@auctiontiger.net</a>, <a href="mailto:sujith@eptl.in">sujith@eptl.in</a>, <a href="mailto:jaymeet.rathod@auctiontiger.net">jaymeet.rathod@auctiontiger.net</a>, <a href="mailto:mehnaz@eptl.in">mehnaz@eptl.in</a>, <a href="mailto:geeta@auctiontiger.net">geeta@auctiontiger.net</a></td>
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</table>
| **9** | **Income Tax & GST:** (a) Income Tax/TDS will be deducted at source as per Govt. Guidelines or latest instructions issued by GoI.  
(b) Reimbursement of GST on work contract will be made only on submission of proper GST invoice as per applicable GST provision. The bidder should comply with the following:  
(i) Bidder have GST Registration Number.  
(ii) Invoice should specifically/separately disclose the amount of GST levied at applicable rate as per GST provision.  
(iii) Bidder should timely file his GST return in accordance with GST provision to enable the bank to claim the credit of GST paid to the Bidder. |
| **12** | In case the Date of submission of Tender Processing Fee, EMD, e-Tendering is declared as a holiday, the respective date will be considered on the next working day at the same time. The bidder, who is the authorized representative and participating on behalf of company/ Dealer/vendor, should have a valid Digital Signature Certificate (DSC) for this tender. |
| **13** | The SBIIMS reserves the right to cancel or postpone or modify the tender at any stage without assigning any reason thereof. |
| **14** | Tenders received without EMD and non-refundable cost of tender documents unsigned and in unsealed envelopes shall be summarily rejected. The tender submitted in any other format is liable for rejection. Moreover, the conditional tenders are liable for rejection and will not be allowed to participate in e-tendering. |
| **15** | The EMD of the unsuccessful Bidders in Technical Bid shall be returned within two weeks from the date of Technical Bids finalization. |
| **16** | All pages of the Technical Bid documents should be serially numbered and shall be signed by the authorized person(s) of the applicant only. The person(s) signing the bid shall sign all pages of the bid and rubber stamp should be affixed on each page. |
| **17** | Vendors to visit our website for any corrigendum till last date of submission. |

**Vice President & Circle Head,**  
**SBIIMSP, Circle office,**  
**BHOPAL.**
The steps involved in making the payment through SB Collect are as under:-

1. The Vendor needs to use SBI internet banking site https://www.onlinesbi.com/.
2. Select "SB Collect" from Top Menu, that will lead to the next page:
3. “Proceed” will lead to the next page:
4. Select “All India” in "State of Corporate / Institution" & Select "Commercial Services" in "Type of Corporate / Institution".
5. “Go” will lead to the next page:
6. Select "SBI Infra Management Solutions" in Commercial Services Name and “Submit”
7. Select “Tender Application Fee” in “Payment Category” and enter the “Tender ID”
   Exactly as we preloaded with characters in Uppercase only in place of Circle Codes.
8. The next Page will be ready with few of the Preloaded Tender Details:
9. The Vendor will have to fill up the fields properly and upon making the payment a receipt will be generated with a Reference No.

Note: - Any type of vendor/contractor, whether dealing with SBI or other Bank can use this SB Collect facility. Even a contractor/vendor not dealing with any Bank, use this portal and generate challan and deposit by cash in any SBI branch. The Bank charges for cash deposit will be also borne by the vendor/contractor himself.
To,

The Vice President and Circle Head,  
SBI Infra Management Solutions Pvt. Ltd.  
SBI, Local Head Office, Mezzanine floor  
Bhopal

TENDER FOR SUPPLY AND INSTALLATION OF UPS SYSTEM WITH BATTERIES  
FOR SBI OFFICES/ BRANCHES LOCATED IN M.P. & CHHATTISGARH

We confirm as under:-

i) We here by agree to post one Service Engineers and to establish service Centre at Bhopal / Indore / Gwalior / Jabalpur / Bilaspur / Raipur Modules for proper & prompt after sales service support with required spares for UPS systems at various Branches/Offices.

ii) We shall provide cell phone/ Mobile to the Service Engineers / Officers so that in case of need, the user can contract him / them.

iii) Delivery period: Within 4 weeks for UPS Systems upto 5 KVA and 6 weeks for UPS Systems of 6 KVA and above (from the date of receipt of written order by the vendor from Bank).

iv) Liquidated Damages: In case of delay in supply beyond stipulated time schedule, we agree and authorize the SBIIMSPL/ Bank (i.e. SBI) to recover liquidated damages @ 0.5 % of the contract value per week subject to ceiling of 5% of the contract value from our dues/ Bills.

SIGNATURE WITH SEAL OF VENDOR

Seal & Signature of Vendor
### Technical Specifications for on-line UPS systems of 1 to 5 KVA

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Technology</td>
<td>UPS systems with pulse width modulation (PWM) technology in True On-line Configuration, with double conversion using IGBTs in the Inverter and converter.</td>
</tr>
<tr>
<td>2</td>
<td>Inversion Technique</td>
<td>Adaptive pulse width modulation or sine weighted pulse width modulation with high switching frequency (&gt; 12 KHZ for IGBTs)</td>
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</tbody>
</table>
| 3   | Input Voltage Range | i) Single Phase  
ii) 240 ± 15%, -30% V  
In either case, there should be input to output Isolation through an inbuilt isolation transformer (see note below).  
Note : Static by-pass arrangement may be connected in such a way that the input and output sides shall always remain galvanically isolated. |
| 4   | Input frequency | 45 Hz to 55 Hz and it should be compatible with DG Set. |
| 5   | Nominal D.C. voltage | 36 V to 240 V DC (taking nominal 2 V per cell). |
| 6   | Output voltage | 220/230 Volts, A.C. + 1% / - 1% |
| 7   | Output frequency | 50 Hz +/- 4% (Synchronous to mains)  
50 Hz +/- 1% (Free running) |
| 8   | Power factor | The UPS shall be provided with Active input P.F. Correction system to obtain P.F. 0.95 to unity when the connected load P.F. varies from 0.6 to unity. |
| 9   | Total Harmonic Distortion (o/p voltage) | < 2% for linear load  
< 4% for non-linear load |
| 10  | Harmonic distortion (Input current) | ≤ 5% at 100% load |
| 11  | Waveform (o/p) | Sine Wave |
| 12  | Overload capacity | 110% for 10 minutes  
150% for 1 minute  
During the test or in actual condition, the load should not get transferred to mains through static switch. |
| 13  | Transient response and voltage recovery time for step load | For 100% Step load(Test at unity P.F. taking rated capacity KVA =KW) i.e. from full load to no load and no load to full load:  
Dip < 3%, Peak < 3% with recovery time within 3 cycles to normal output voltage. |
| 14  | a) Efficiency | Overall > 91.5% ± 1 i.e. between 90.5 & 92.5% at full load, 88% ± 1 at 66% load and 85% ± 1 at 33% load. |
b) Rated KVA: The UPS should be capable to deliver rated KVA at 0.8 P.F. i.e. 5 KVA UPS should be capable to deliver 4 KW load at 0.8 P.F.

**Definition of overall efficiency:** It is the ratio of output power in KW to the input power with battery disconnected, or, battery charging power added to the output. Testing shall be at full load, 66% load and 33% load unity PF, i.e. rated capacity in KVA = KW.

**Penalty applicable** – If the overall efficiency is found to be less than the Bank’s specified range, the UPS is to be rejected and replacement passing the test to be obtained. No further tolerance is permissible.

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<th>Accepted / Not accepted (Please fill in)</th>
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<tr>
<td>15</td>
<td>Operating Temperature</td>
<td>0 to 50 Degree Celsius</td>
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<tr>
<td>16</td>
<td>Crest factor</td>
<td>&gt; 3.0</td>
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<tr>
<td>17</td>
<td>Relative Humidity</td>
<td>95% at 35 Degree Centigrade non-condensing.</td>
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<tr>
<td>18</td>
<td>Noise level</td>
<td>At 1 meter from the UPS. &lt; 55 dba for &lt; 10 KVA. &lt; 60 dba for &gt; 10 KVA. (Proto-type test certificate required).</td>
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<td>19</td>
<td>Charger</td>
<td>Built in solid state float-cum-boost charger with automatic boost/trickle charge modes with current limiting features. The charger characteristics shall be such as to match the float/boost charging of the batteries as per battery characteristic, for enhancing the life of batteries. The charger should be designed for at least 15% of the total battery current as per working given below: Example:- Battery terminal voltage – 408 V DC Battery AH - 100 AH Total Battery Capacity : 408 x 100 VAH = 40,800 VAH Total Battery Current = 40,800/409 = 100Amps Minimum charging Current required @ 15% = 100 x 15/100 = 15 Amps.</td>
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<td>20</td>
<td>Interface facility</td>
<td>The UPS system should have necessary hardware and software a) USB port to work on existing operating systems. b) Remote manageability through SNMP facility. There should be a facility to monitor and broadcast to all workstations, whenever necessary, conditions such as: i) Power failure : UPS working on batteries preferably to indicate a). Present load in percentage</td>
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<tr>
<td><strong>21 Remote indication unit</strong></td>
<td>In system/systems Administrator Room with indications like Mains on, Inverter ON/OFF /Faulty/ Trip, Battery Low and static by-pass ON. 25 meters inter connecting cable to be included in price quoted.</td>
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| **22 Protection** | a) Isolation: Output shall be fully isolated from mains and surge / spike suppressors to be incorporated.  
   c). Soft start on Inverter and charger arrangement  
   d). Over voltage / under voltage protection (high speed) for devices such as IGBTs.  
   f). Short circuit protection through MCB/MCCB  
   g). All other protection systems required for safety of UPS system, such as over temperature protection etc.  
   i). Protection against earth leakage current by suitable protective devices like negative sequence current sensor/ RCCB. |

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<tr>
<td><strong>23 Static Auto) bye-pass switch (thyristor based)</strong></td>
<td>Bi-directional with change over time less than 10 milliseconds in free running mode and instantaneous in synchronous mode from Inverter to bye-pass and vice-versa.</td>
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<tbody>
<tr>
<td>II). Manual by-pass switch</td>
<td>Should be provided.</td>
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| **24 Indications** | a). Mains ON with phase indication for single phase / 3 phase separately for all the phases.  
   b). Inverter ON / OFF / FAULTY / TRIP (Reason)  
   *c). Charger ON / FAULTY OR TRIP (Reason)  
   d). Battery Low  
   e). Static by-pass ON  
   f). Over temperature  
   g). Earth Leakage |

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| **25 Alarm** | (i) Low battery alarm to be provided  
   ii) mains failure / load on battery alarm to be provided. Both should be audio visual.  
   iii) Over temperature alarm in two stages  
   1st stage: Warning, intermittent audio alarm  
   2nd stage: Tripping, continuous audio visual and resetable. |
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</table>
| 26 | **Metering** | Digital panel Meter duly calibrated upto 1.5 accuracy class or LCD display system to indicate the following  
   i). A.C. voltage: Input, output  
   ii). A.C. current: Input, output  
   iii). D.C. battery voltage  
   iv). D.C. Charging / discharging current  
   v). Frequency – Input, Output |
| 27 | **Battery set**  
   | **A. SMF Batteries** | i) Complete with self-standing cubicle or cabinet  
   |   | **B) Tubular batteries** | (ventilated room is required)  
   i) maintainable but regular topping necessary  
   ii) complete with stand  
   iii) Make like: Exide, Southern Batteries, Kirloskar Batteries, AMCO-instapower. |
|   |   | In the both cases, the UPS vendors to specify, the make of battery they propose to use, they have to submit detailed literature of battery and battery manufacturers capability etc.)  
   a) Back-up time shall be designed with battery drain of less than 75% or as per manufacturer’s recommendations for enhanced battery life.  
   b) The back-up time at full load shall be 2 hours.  
   c). Battery set details to be indicated by the supplier:  
   i). D.C. Terminal voltage  
   ii). No. of batteries and each battery voltage  
   iii). Ampere-Hour capacity of each battery  
   d). End cell voltage for cut off shall be considered as 1.75 / cell  
   e). Only Valve Regulated Lead Acid (VRLA) type SMF batteries with electrolyte in paste form are acceptable. Any other type including calcium based batteries are not acceptable. |

Battery capacity for SMF batteries to be specified in tender shall be calculated in VAH as under:

\[
D.C. \text{ Current} = \frac{\text{UPS KVA} \times 1000 \times \text{Load Power factor (}=1)}{\text{Inverter Efficiency} \times \text{End Voltage}}
\]

\[
= \frac{\text{UPS KVA} \times 1000 \times 1}{0.93 \times \text{End Voltage}} \quad (\text{Assumption: Inverter Efficiency -93%})
\]

Capacity of battery AH) = \[\frac{D.C. \text{ current} \times \text{duration in Hrs.}}{\% \text{ capacity utilisation}}\]

\[\text{VAH} = \text{AH} \times \text{Nominal voltage}\]
End voltage may be taken either as 1.75 V i.e. for one cell, or 10.5 V (one battery with 6 cells). Accordingly, the nominal voltage shall be 2 V for one cell, or 12 V (for one battery with 6 cells) respectively. The VAH figures in either case shall be the same.

The tendered battery set shall have minimum VAH as indicated above. Tenderers quoting for higher VAH shall not be given any benefit.

A sample calculation in case of Tubular Batteries is given below for guidance while using tubular batteries.

UPS Rating: 10 KVA
Inverter Efficiency: 93%
Load Power Factor: 1.0
End Cell Voltage: 1.75 V
Load pattern: Full load for 1 hr.
Temperature: 25 Deg. Centigrade

Discharge Current: \[ = \frac{10 \times 1000 \times 1.0}{1.75 \times 0.93} \]
\[ = 6144.39 \text{ amps} \]
AH = 1 Hr. x 6144.39
\[ = 6144.39 \]

From the table given below, Effective capacity at 1 Hr. rate = 50% of rated capacity
Therefore, capacity required = \[\frac{6144.39}{0.5} = 12,288.78 \]

VAN = Nominal Cell Voltage x AH
\[ = 2 \times 12,288.78 = 24,577.56 \]

Now if we want to use a 240 V System
AH = \[\frac{24,577.56}{240} = 102 \]

Capacity: Ampere Hour Output as a percentage of 10 Hr. Capacity when discharging In:

<table>
<thead>
<tr>
<th>Hour Final</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>1.75</td>
<td>1.78</td>
<td>1.80</td>
<td>1.81</td>
<td>1.82</td>
<td>1.83</td>
<td>1.83</td>
<td>1.84</td>
<td>1.84</td>
<td>1.85</td>
</tr>
<tr>
<td>% of 10 Hr</td>
<td>50.0</td>
<td>83.3</td>
<td>71.7</td>
<td>78.2</td>
<td>83.3</td>
<td>87.9</td>
<td>91.7</td>
<td>95.0</td>
<td>97.9</td>
<td>100</td>
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28. Testing:

The supplier shall have facilities to carry out the following tests at factory center, and tests will have to be satisfactorily carried out before acceptance.

*a) No load voltage variation tests (voltmeter with variac for input variation)*

*b) Steady state regulation tests voltmeter with standard load)*

c). Harmonic distortion tests Distortion meter)
   i) output voltage ii) input current

d). Overload tests (Simulate)

e). Waveform tests on oscilloscope
   i) No load ii) Resistive load iii). Inductive load

iv). SMPS load or Electronic load (If SMPS load is not available at the factory, the same should be stimulated by using as load a configuration of another UPS and resistive load as Under:

```
INPUT  OUTPUT
(Should not be a Unity P.F. UPS)
```

f). Inverter high / low output voltage setting tests (simulate)

*g) Static by-pass settings, by-pass time, bi-directionality of static switch operation on storage oscilloscope (simulate)*.

h). Short circuit protection / current limit (simulate)

i). Battery low alarm settings cut-off tests. (Test to be conducted by simulation)

j). Efficiency tests (arrange load tests)

k). Overall efficiency a) Full load b) 66% load c) 33% load

l). Endurance : System to be switched on with full load for 8 hours to demonstrate that it operates without any malfunction including temperature rise (type test).

m). Earth leakage

n). Charging Current – current limiting capability testing to be simulated by increasing charger voltage

o). Battery back up test at full load

p). Input Power Factor

q) Crest factor

r) Test to demonstrate the switching frequency more than 12 KHZ)*

*Not mandatory in case of UPS upto 3 KVA but mandatory for UPS greater than 3 KVA
Tests shall be carried out and certified by the agencies specified here under:
i). SAMEER  ) The Bank may, at its
discretion, depute its
engineer to witness the tests
iv) I.I.T.s / Engineering Colleges of repute

In addition to the tests mentioned under “testing” in “Technological specifications for “On-Line UPS System”, the following tests/ certifications, shall also be, performed by / obtained from, the agencies specified above.

i). Technology certificate
ii). Inversion Technique certificate
iii). Tests at b), c), d) & j) shall be performed with full resistive load, full inductive load and SMPS load.
iv). Test at k) shall be performed with full resistive load.

Notes: I) If the UPS does not conform to specifications either during factory test or at site, the Bank reserves the right to reject the same. The successful tenderer shall then have to remove the same at his cost from site and supply a new piece conforming to the specifications.

ii). The successful tenderer shall have to make all arrangements for all types of loads and electric supply required for the tests mentioned herein. The SBIIMSPL/ Bank reserves the right to randomly decide to carry out testing of a few UPS systems at site after installation at the cost of UPS vendor, who will be required to arrange for all the requisite variacs, maters, loads etc. and carry out the tests through vendor’s personnel in the presence of SBIIMSPL/ Bank’s engineer/s.
# Technical Specifications for on-line UPS systems of 6 to 20 KVA

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
</table>
| 1   | Technology                                                                   | (a) UPS systems with pulse width modulation (PWM) technology in True On-line Configuration, with double conversion using IGBTs in the Inverter and converter.  
(b) Provision for configuring three or more UPS system in parallel load sharing mode. Indicate the maximum No. of UPS system that can be connected in parallel for forming N + 1 (Configuration)  
(c) The requirement is for fully rated capacity of single module in parallel with similar module sharing the load having provision for adding one or two modules of similar units. Paralleling of UPS should be achieved by paralleling the output on the power side using control logic single bus. Each UPS should be capable of individually sharing, running and feeding to the load apart from parallel operation. Individual battery backup is necessary. Invertors should be synchronized with common by pass supply (Example: for 10 KVA load, we consider 2 Nos. of 10 KVA each UPS system in parallel load sharing mode with provision to add one or two numbers of 10 KVA each similar UPS systems in future). |
| 2   | Inversion Technique                                                          | Adaptive pulse width modulation or sine weighted pulse width modulation with high switching frequency ( > 12 KHZ for IGBTs).                                                                                                                                                                                                                                                                                                                                                           |
| 3   | Input Voltage Range                                                          | i) Three Phase 415 + 15%, -30%  
(Three phase supply to UPS systems up to 20 KVA)  
In either case, there should be input to output Isolation (see note below).  
Note : Static by -pass arrangement may be connected in such a way that the input and output sides shall always remain galvanically isolated.                                                                                                                                                                                                                                                                                                                                 |
| 4   | Input frequency                                                              | 45 Hz to 55 Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 5   | Nominal D.C. voltage                                                         | 72 V to 408 V DC taking nominal 2 V per cell).                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 6   | Output voltage                                                               | 220/230 V.A.C. + 1% / - 1%  Single Phase output                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7   | Output frequency                                                             | 50 Hz +/- 4% (Synchronous to mains)  
50 Hz +/- 1% (Free running)                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 8   | Power factor                                                                 | The UPS shall be provided with Active input P.F. correction system to obtain P.F. 0.95 to unity when the connected load P.F. varies from 0.6 to unity.                                                                                                                                                                                                                                                                                                                                                                                                      |
| 9   | Total Harmonic Distortion (o/p voltage)                                       | < 2% for linear load  
< 4% for non-linear load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
<p>| | | |</p>
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</table>
| 10 | Harmonic distortion (Input current) | ≤ 10% at 50% load.  
< 5% at full load |
|   |   |   |
| 11 | Waveform (o/p) | Sine Wave |
|   |   |   |
| 12 | Overload capacity | 110% for 10 minutes  
150% for 1 minute |
|   | During the test the load should not get transferred to mains through static switch. |
|   |   |   |
| 13 | Transient response and voltage recovery time for step load | For 100% Step load (Test at unity P.F. taking rated capacity KVA = KW) i.e. from full load to no load and no load to full load.  
Dip < 3%  
Peak < 3% with recovery time within 3 cycles to normal output voltage. |
|   |   |   |
| 14 | Efficiency | Overall > 91.5%±1 i.e. between 90.5 & 92.5% at full load, 88% ± 1 at 66% load and 85% ± 1 at 33% load. |

**Definition of overall efficiency:** It is the ratio of output power in KW to the input power with battery disconnected, or, battery charging power added to the output. Testing shall be at full load, 66% load and 33% load unity PF, i.e. rated capacity in KVA = KW).

**Penalty applicable** – If the overall efficiency is found to be less than the Bank’s specified range, the UPS is to be rejected and replacement passing the test to be obtained. No further tolerance is permissible.

<p>| | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>15</td>
<td>Operating Temperature</td>
<td>0 to 50 Degree Celsius</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Crest factor</td>
<td>&gt; 3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Relative Humidity</td>
<td>95% at 35 Degree Centigrade non-condensing.</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
| 18 | Noise level | At 1 meter from the UPS.  
≤ 55 dba for < 10 KVA.  
≤ 60 dba for > 10 KVA.  
(Proto-type test certificate required). |
|   |   |   |
| 19 | Charger | Built in solid state float-cum-boost charger with automatic boost/trickle charge modes with current limiting features.  
The charger characteristics shall be such as to match the float/boost charging of the batteries as per battery characteristic, for enhancing the life of batteries.  
The charger should be designed for at least 15% of the total battery current as per working given below:  
Example:-  
Battery terminal voltage = 408 V DC  
Battery A H = 100 A H  
Total Battery Capacity : 408 x 100 VAH = 40,800 VAH  
Total Battery Current = 40,800/409 = 100Amps  
Minimum charging Current required @ 15% =  
100 x 15/100 = 15 Amps. |
<p>| | | |</p>
<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td><strong>Interface facility</strong></td>
<td>The UPS system should have necessary hardware and software. a) USB port to work on existing operating systems. b) Remote manageability through SNMP facility. There should be a facility to monitor and broadcast to all workstations, whenever necessary, conditions such as: i) Power failure: UPS working on batteries preferably to indicate a) Present load in percentage b) Time up to which batteries can support with present load (Dynamic battery backup time) c) Warning well in advance of shut down of the system. ii) The software should be capable of automatically closing the files (“Auto file closure” feature) so that the data/program files on our computers are not lost/corrupted.</td>
</tr>
<tr>
<td>21</td>
<td><strong>Remote Indication unit</strong></td>
<td>In system/systems Administrator Room with indications like Mains on, Inverter ON/OFF /Faulty/Trip, Battery Low and static by-pass ON. 25 meters interconnecting cable to be included in price quoted.</td>
</tr>
<tr>
<td>22</td>
<td><strong>Protection</strong></td>
<td>a). Isolation: Output shall be fully isolated from mains and surge/spike suppressors to be incorporated. b). Current limiting protection Fuse less Electronic): Built in overload/short circuit protection with snubber circuits for current limit. c). Soft start on Inverter and charger arrangement *d). Phase locking mechanism for UPS and mains frequency for 3 phase output. e) Over voltage/under voltage protection. f). Short circuit/overload protection through MCB/MCCB g). All other protection systems required for safety of UPS system, such as over temperature protection etc. i). Protection against earth leakage current by suitable protective devices like negative sequence current sensor/RCCB.</td>
</tr>
<tr>
<td>23</td>
<td><em>I). Thyristor based Static (Auto) by-pass switch</em>* II). Manual by-pass switch</td>
<td>Bi-directional with change over time less than 10 milliseconds in free running mode and instantaneous in synchronous mode from Inverter to by-pass and vice-versa. Should be provided.</td>
</tr>
<tr>
<td>24</td>
<td><strong>Indications</strong></td>
<td>a). Mains ON with phase indication for single phase/3 phase separately for all the phases. b). Inverter ON/OFF/FAULTY/TRIP (Reason) *c). Charger ON/FAULTY OR TRIP (Reason) d). Battery Low e). Static by-pass ON f). Over temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| 25 | Alarm | (i) Low battery alarm to be provided  
   ii) Mains failure / load on battery alarm to be provided. Both should be audio visual.  
   iii) Over temperature alarm in two stages  
   1st stage: Warning, intermittent audio alarm  
   2nd stage: Tripping, continuous audio visual and resetable. |
| 26 | Metering | Digital panel Meter duly calibrated upto 1.5 accuracy class or LCD display system to indicate the following  
   i). A.C. voltage: Input, output  
   ii). A.C. current : Input, output  
   iii). D.C. battery voltage  
   iv). D.C. Charging / discharging current  
   v). Frequency – Input, Output |
| 27 | Battery set | i) Complete with self-standing cubicule or cabinet  
   ii) Make like : Panasonic, C.S.B., Yuasa, Global Yuasa, Amararaja, New Max, AMCO-best, U-plus, HBL, Numeric, Hitachi |
|   | A) SMF Batteries |   |
|   | B) Tubular batteries | (ventilated room is required)  
   i) maintainable but regular topping necessary  
   ii) complete with stand  
   iii) Make like: Exide, Southern Batteries, Kirloskar Batteries, AMCO-instapower.  
   In the both cases, the UPS vendors to specify, the make of battery they propose to use, they have to submit detailed literature of battery and battery manufacturers capability etc.)  
   a) Back-up time shall be designed with battery drain of less than 75% or as per manufacturer’s recommendations for enhanced battery life.  
   b) The back-up time at full load shall be 1 hour.  
   c). Battery set details to be indicated by the supplier:  
   i). D.C. Terminal voltage  
   ii). No. of batteries and each battery voltage  
   iii). Ampere-Hour capacity of each battery  
   d). End cell voltage for cut off shall be considered as 1.75 / cell  
   e). Only Valve Regulated Lead Acid (VRLA) type SMF batteries with electrolyte in paste form are acceptable. Any other type including calcium based batteries are not acceptable. |

Battery capacity for SMF batteries to be specified in tender shall be calculated in VAH as under:  

D.C. Current  = \( \frac{\text{UPS KVA} \times 1000 \times \text{Load Power factor} = 1)}{\text{Inverter Efficiency} \times \text{End Voltage}} \)  

= \( \frac{\text{UPS KVA} \times 1000 \times 1}{0.93 \times \text{End Voltage}} \) (Assumption: Inverter Efficiency –93%)  

Capacity of battery AH) = \( \frac{\text{D.C. current} \times \text{duration in Hrs.}}{\% \text{ capacity utilisation}} \)
Tender ID: BHO202007005

Date: 07/07/2020

VAH = AH x Nominal voltage

### Duration % capacity utilisation

<table>
<thead>
<tr>
<th>Duration</th>
<th>% capacity utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>½ hr. (30 min.)</td>
<td>52%</td>
</tr>
<tr>
<td>1 hr.</td>
<td>62%</td>
</tr>
<tr>
<td>2 hrs.</td>
<td>74%</td>
</tr>
<tr>
<td>3 hrs.</td>
<td>83%</td>
</tr>
<tr>
<td>4 hrs.</td>
<td>85%</td>
</tr>
</tbody>
</table>

End voltage may be taken either as 1.75 V i.e. for one cell, or 10.5 V (one battery with 6 cells). Accordingly, the Nominal voltage shall be 2 V for one cell, or 12 V (for one battery with 6 cells) respectively. The VAH figures in either case shall be the same.

The tendered battery set shall have minimum VAH as indicated above. Tenderers quoting for higher VAH shall not be given any benefit.

A sample calculation in case of Tubular Batteries is given below for guidance while using tubular batteries.

**UPS Rating: 10 KVA**

Inverter Efficiency: 93%

Load Power Factor: 1.0

End Cell Voltage: 1.75 V

Temperature: 25 Deg. Centigrade

Load pattern: Full load for 1 hr.

Discharge Current: \[ \frac{KVA \times 1000 \times \text{Load P.F.}}{\text{End Cell voltage} \times \text{Inv. Efficiency}} \]

\[= \frac{10 \times 1000 \times 1.0}{1.75 \times 0.93} = 6144.39 \text{ amps} \]

\[\text{AH} = 1 \text{ Hr.} \times 6144.39 = 6144.39 \]

From the table given below

<table>
<thead>
<tr>
<th>Hour Final</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>1.75</td>
<td>1.78</td>
<td>1.80</td>
<td>1.81</td>
<td>1.82</td>
<td>1.83</td>
<td>1.83</td>
<td>1.84</td>
<td>1.84</td>
<td>1.85</td>
</tr>
<tr>
<td>% of 10 Hr</td>
<td>50.0</td>
<td>83.3</td>
<td>71.7</td>
<td>78.2</td>
<td>83.3</td>
<td>87.9</td>
<td>91.7</td>
<td>95.0</td>
<td>97.9</td>
<td>100</td>
</tr>
</tbody>
</table>

Effective capacity at 1 Hr. rate = 50% of rated capacity

Therefore, capacity required = \[ \frac{6144.39}{0.5} = 12,288.78 \]

VAH = Nominal Cell Voltage x AH

\[= 2 \times 12,288.78 = 24,577.56 \]

Now if we want to use a 240 V System

\[\text{AH} = \frac{24,577.56}{240} = 102 \]

Capacity: Ampere Hour Output as a percentage of 10 Hr. Capacity when discharging in:

Seal & Signature of Vendor
L. The minimum VAH required for various rating of UPS systems are as under:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Capacity of UPS</th>
<th>Minimum VAH required 2 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 KVA</td>
<td>3324 VAH</td>
</tr>
<tr>
<td>2</td>
<td>2 KVA</td>
<td>6648 VAH</td>
</tr>
<tr>
<td>3</td>
<td>3 KVA</td>
<td>9960 VAH</td>
</tr>
<tr>
<td>4</td>
<td>4 KVA</td>
<td>13235 VAH</td>
</tr>
<tr>
<td>5</td>
<td>5 KVA</td>
<td>16608 VAH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Capacity of UPS</th>
<th>Minimum VAH required 1 hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7.5 KVA</td>
<td>14868 VAH</td>
</tr>
<tr>
<td>2</td>
<td>10 KVA</td>
<td>19824 VAH</td>
</tr>
<tr>
<td>3</td>
<td>15 KVA</td>
<td>29736 VAH</td>
</tr>
<tr>
<td>4</td>
<td>20 KVA</td>
<td>39636 VAH</td>
</tr>
</tbody>
</table>

28. **Testing:**

The supplier shall have facilities to carry out the following tests at factory center, and tests will have to be satisfactorily carried out before acceptance.

*a) No load voltage variation tests (voltmeter with variac for input variation)*

*b) Steady state regulation tests voltmeter with standard load*

c. Harmonic distortion tests Distortion meter)
   i) Output voltage    ii) input current

d. Overload tests (Simulate)

e. Waveform tests on oscilloscope

i) No load    ii) Resistive load    iii) Inductive load

iv). SMPS load or Electronic load (If SMPS load is not available at the factory, the same should be stimulated by using as load a configuration of another UPS and resistive load as Under:

![input-output waveforms]

(Should not be a Unity P.F. UPS)

f). Inverter high / low output voltage setting tests (simulate)

*g) Static by-pass settings, by-pass time, bi-directionality of static switch operation on storage oscilloscope (simulate).

h). Short circuit protection / current limit (simulate)

i). Battery low alarm settings cut-off tests. (Test to be conducted by simulation)

j). Efficiency tests (arrange load tests)

k). Overall efficiency  a) Full load   b) 66% load   c) 33% load

l). Endurance : System to be switched on with full load for 8 hours to demonstrate that it operates without any malfunction including temperature rise (type test).
m). Earth leakage
n). Charging Current – current limiting capability testing to be simulated by increasing charger voltage
o). Battery back up test at full load
p). Input Power Factor
q). Crest factor
r) Test to demonstrate the switching frequency more than 12 KHZ)

* Not mandatory in case of UPS upto 3 KW but mandatory for UPS greater than 3 KW.

Tests shall be carried out and certified by the agencies specified here under:
i). SAMEER ) The Bank may, at its
ii). ETDC ) discretion, depute its
iii). ERTL ) engineer to witness the tests
iv) I.I.T.s / Engineering Colleges of repute

In addition to the tests mentioned under “testing” in “Technological specifications for “On-Line UPS System”, the following tests/ certifications, shall also be, performed by / obtained from, the agencies specified above.

i). Technology certificate
ii). Inversion Technique certificate
iii). Tests at b), c), d) & j) shall be performed with full resistive load, full inductive load and SMPS load.
iv). Test at k) shall be performed with full resistive load.

Notes: I) If the UPS does not conform to specifications either during factory test or at site, the Bank reserves the right to reject the same. The successful tenderer shall then have to remove the same at his cost from site and supply a new piece conforming to the specifications.

ii). The successful tenderer shall have to make all arrangements for all types of loads and electric supply required for the tests mentioned herein. The Bank reserves the right to randomly decide to carry out testing of a few UPS systems at site after installation at the cost of UPS vendor, who will be required to arrange for all the requisite variacs, maters, loads etc. and carry out the tests through vendor’s personnel in the presence of Bank’s engineer/s.
“PART A”: General Terms & conditions for UPS tender

The General /detailed terms and conditions of the tender are as under:

(i) No tender will be accepted after 03:00 PM on the 30/07/2020

(ii) Unsealed tender will not be accepted.

(iii) **All Pages of the tender shall be signed and sealed failing which Bank may consider disqualifying such tender within its sole discretion which please note.**

(iv) Tender with corrections and/or overwriting will be liable to be rejected if they are not initiated for authentication. All rates should be quoted in words and in figures (Online).

(v) Only the tenders which are complete in all respects with all information and contents/documents required will be taken into consideration.

(vi) **The rate quoted shall be firm and shall include all costs, allowances, taxes, levies, charges ( delivery of UPS & Batteries F.O.R at site i.e branch/ office including making connection, testing etc. complete which please note) royalties, cess etc. but excluding GST as applicable which will be reimbursed by the Bank as per Govt. norms prevailing from time to time.**

No increase in the quoted/approved rate shall be allowed by the Bank within the validity of contract.

(vii) The vendors have to engage reliable skilled workers and shall follow all labour laws and acts and shall go in for insurance for all risks at his own cost.

(viii) The tenders shall remain open for acceptance by the Bank for a period of Ninety days from the date of opening of the tender which period may be extended by the mutual agreement and the tenderer shall not cancel or withdraw their offer during this period.

(ix) The vendors whose tender is accepted shall take up the work in hand immediately and supply within 4 week for UPS upto 5 KVA and 6 KVA and above (from the date of receipt of our order by the vendor).

(x) The Vendor shall acquaint themselves thoroughly with all the matters concerning the work. They should also be well conversant with rates of Local Taxes and other rates and charges of the Government royalty charges etc. which are to borne by them.

(xi) Materials to be used shall be strictly according to the specifications for work conforming to relevant Bureau of Indian Standards and of makes/Brands as approved.

(xii) The SBIIMSPL/ Bank reserves the right to reject/allot/accept any tender or accept any part or parts of tender(s) offered without assigning any reasons.

(xiii) No request for advance will be entertained by the Bank. Payment of supplier/vendor bills shall be made on receipt of material at branch/office.

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Seal & Signature of Vendor
including its all satisfactory installation, testing and commissioning at site. A sum equivalent to 5% of the invoice value shall be retained by the Bank as retention Money which will be released after the expiry of defect liability period/Guarantee period of one year from the date of commissioning the UPS & Battery or 15 months from the date of delivery whichever is earlier. The bank may consider retaining Money on producing a Bank guarantee for an equal sum as per the format approved by the Bank and issued by any nationalized Bank Valid for defect liability period/Guarantee period.

(xiv) The Earnest Money of Rs. 25,000/- in the form of Demand draft/ Banker’s Cheque of any public sector bank favoring AGM (P&E), State Bank of India, Local Head Office, Bhopal payable at Bhopal will have to be deposited along with the tender in part A. The EMD of unsuccessful bidder shall be released within 30 days from the date of acceptance of tender. Tender submitted without EMD shall be summarily rejected.

(xv) If the vendor fails to deliver the material within stipulated time period as specified in the clause (ix) above or within any reasonable extended time given by the Bank, the vendor shall pay or allow the SBIIMSPL/Bank the sum at a rate of Rs. 0.5% of the purchase order value/contract value per week and subject to maximum of 5% of the purchase order value/contract value as liquidated Damages for the period during which the said works shall so remain incomplete and the Bank may deduct such damages from any money due to the vendor.

(xvi) Conditional tenders are liable to for rejection.

(xvii) In Case you are not interested to quote your rates for subject work please return all the tender documents.

(xviii) Please return this NIT in Original in the sealed envelope along with the declaration mentioned below as a token of acceptance of all the terms and conditions mentioned in the tender.

(xix) The approved rates will be valid for a period of one year from the Date of acceptance of tender.

(xx) The SMF Batteries shall be guaranteed for one year from the Date of commissioning or 15 Months from the date of delivery whichever is earlier.

Vice President & Circle Head
SBIIMSPL, Circle office, Bhopal

Declaration

We have understood all the above conditions. If we fail to start/or execute the work within the stipulated period of time our earnest money may be forfeited.

Signature and Seal of Vendor