Government of India
Bhabha Atomic Research Centre, Mysuru
Proj. SMF Challakere, Chitradurga

Ref.: BARC/SMFC/FMF/2024/LTSS/NIT/C-2 05.02.2026

Name of the Tender: Composite work of SITC of Electrical Systems and Design & Construction of civil works in Substations at SMFC, BARC, Challakere, Karnataka for:

A. SITC of 2 X 2.5 MVA, 11/0.433 kV LT substation with HT & LT Panels; HT & LT Cables; 2 Nos. of 750 kVA, 0.433 kV DG including design & construction of civil structures for new Substation building-1, cable trenches, finishing works and associated electrical works.
B. SITC of 2 X 2.5 MVA, 11/0.433 kV LT substation with HT & LT Panels; HT & LT Cables; including construction of balance civil works in an existing Substation building-2, cable trenches, finishing works and associated electrical works''.

Tender No.: BARC/SMFC/FMF/2024/LTSS/NIT; dt.: 23-12-2025.

CPP Portal Tender ID.: 2025_BARC_891245_1

Corrigendum-2

1. With reference to the above tender, all bidders are requested to note the following clarifications

a. As per Corrigendum-1/ reply to pre-bid queries **Clause-VI.44** added in **Section-I-NIT,** as E-Bank Guarantee (e-BG) is also acceptable and preferred wherever BG is applicable.

Clarification:

i. The maximum BG/e-BG amount which is part of EMD shall be as per Page 16 of 28, Clause-V.21, Section-I-NIT.

ii. It shall be issued in favour of "**Pay and Accounts Officer, BARC, Mysore".** The beneficiary bank name and address are: State Bank of India, Main Branch, Mysuru, IFSC SBIN0003130**.**

iii. As a general convention, above mentioned details in said (ii) are only shared. Bidders shall submit BG/e-BG accordingly.

b. SLD of Financial Bid, PART-III, Electrical works, BOQ Sl. No 4.04 ''SITC of Mains Class IV Panel Type – 4'' is attached as Enclosure-1. Specifications of this item shall be as mentioned in Section-V (iv), Chapter-6 (LT Power Distribution Panels as per Specifications).

2. Revised Tender bid end date & timings are as follows:

Sl.NO	Tender activity	Existing Date and time as per corregundum-1	Revised Date and time
1	Bid Submission End Date & End Date of Download of Bid Documents	09-02-2026, 16:00:00	16-02-2026, 16:00:00
2	Submission of EMD in physical form	13-02-2026, 14:00:00	20-02-2026, 14:00:00
3	Bid opening Date /Date and time of online opening of Cover-1	13-02-2026, 15:00:00	20-02-2026, 15:00:00

3. These clarifications shall form a part of the tender document. It shall be deemed that all bidders who submit their bids have read and accepted the pre-bid clarifications.

4. Bidders are requested for submission of bid within the above-mentioned period. No further extension will be entertained.

5. All other tender conditions remain unchanged.

Encl.: 1) SLD of BOQ Sl. No 4.04''SITC of Mains Class IV Panel Type – 4''.

Sd/-
Chief Engineer, BARC, Mysuru
For and on behalf of President of India

Ref.: Corrigendum-2: BARC/SMFC/FMF/2024/LTSS/NIT/C-2, Dated 05.02.2026

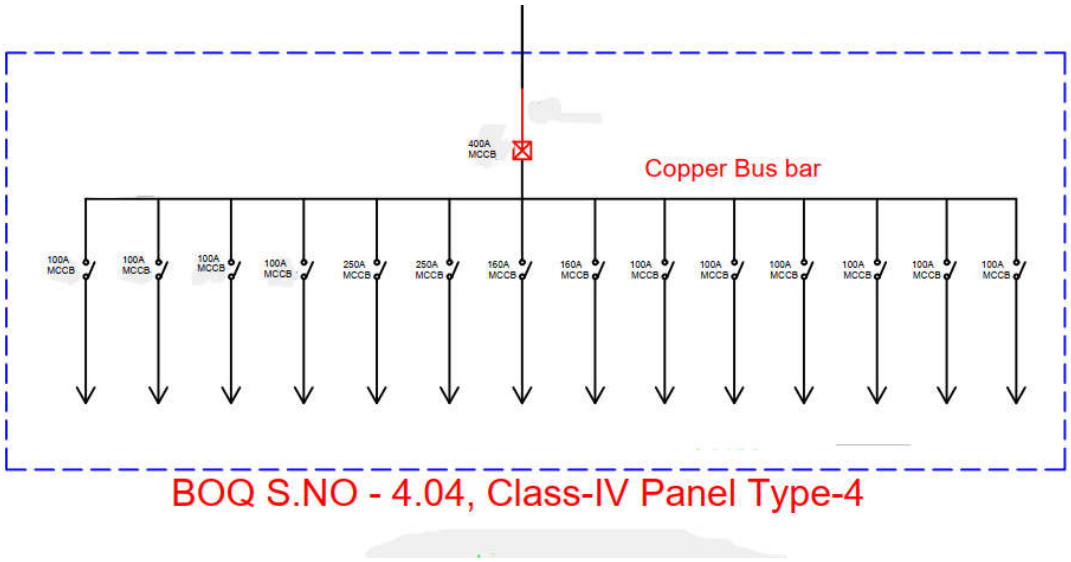
Name of the Tender: Composite work of SITC of Electrical Systems and Design & Construction of civil works in Substations at SMFC, BARC, Challakere, Karnataka for:

A. SITC of 2 X 2.5 MVA, 11/0.433 kV LT substation with HT & LT Panels; HT & LT Cables; 2 Nos. of 750 kVA, 0.433 kV DG including design & construction of civil structures for new Substation building-1, cable trenches, finishing works and associated electrical works.
B. SITC of 2 X 2.5 MVA, 11/0.433 kV LT substation with HT & LT Panels; HT & LT Cables; including construction of balance civil works in an existing Substation building-2, cable trenches, finishing works and associated electrical works''.

Tender No.: BARC/SMFC/FMF/2024/LTSS/NIT; dt.: 23-12-2025.

CPP Portal Tender ID.: 2025_BARC_891245_1

SLD of Financial Bid, PART-III, Electrical works, BOQ Sl. No 4.04 ''SITC of Mains Class IV Panel Type – 4''



a) Incomer – 400 A MCCB, Outgoings – (250A MCCB – 2 No's, 160A MCCB-2 No's, 100A MCCB- 10 No's)

b) Specifications of this panel shall be as mentioned in Section-V (iv), Electrical Specifications, Chapter-6 (LT Power Distribution Panels as per Specifications).

c) Requirement, Location and Incomers is to be Finalized as per Process load requirement during the Execution Stage.

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Additional Clarifications and Specifications Raised by Bidders:

Bid clarifications for certain items are enclosed and shall form a part of the tender document. It shall be deemed that all bidders who submit their bids have read and accepted these clarifications.

Query	Clarification
HT & LT Panels SOQ No 1 to SOQ No-6.	In SLD Bus-bars shown some places as Aluminum due to typo error. Bidder shall consider **Bus-bars are of Copper Material** For all Panels as per specifications from SOQ No 1 to SOQ No-6.
Electrical Specifications Page No-115&116 Desktop Computer. 512TB HDD doesn't existing in the Single HDD, please clarify	Bidders shall read it as 512 GB SSD/HDD instead if 512 TB HDD.
SOQ no 17 SITC of AC and DC UPS System as per Specifications	There is missing Pages from Page No 100 to 102 in The Specifications due to Some error. Specifications mentioned herewith this document and bidder shall consider these specifications.

All other tender conditions remain unchanged.

Chapter -13:

13.1 Specifications for

SOQ 17.01 - 24 Volts 200 Amps DC UPS system with batteries**– Battery Backup of 2 Hrs.**

SOQ 17.02 - 110 Volts 50 Amps DC UPS system with batteries **– Battery Backup of 2 Hrs.**

13.1.1 Scope of the work:

The intent of this specification is to define the requirements of Float cum Boost Charger (FCBC) system and associated battery bank with accessories etc. Tenderer's scope of work Includes design, manufacture, testing, Pre dispatch inspection, packing and delivery to site and testing & commissioning of the complete FCBC systems with battery banks etc., as per this specification, data sheet.

13.1.2 Standards:

In general, the equipment covered by this specification shall, unless otherwise specified, be in line with the requirement of any of the latest applicable standards of

a) Bureau of Indian Standards
b) International Electro Technical Commission
c) Wherever the requirements in this specification are in conflict with any of the above Standards, the requirements under this specification shall be binding.
d) In case any contradiction between various referred standards/specification/data sheets and statuary regulation etc.., the following order of priority shall be governing.
   i. Schedule of rate
   ii. Data sheet
   iii. Standard specification
   iv. Codes & standard

13.1.3 General Requirements & Technical Parameters:

S. No	Parameter	Requirement
1	Product Name	Float Cum Boost Charger (DC UPS)
2	**Rating**	**As per SOQ/BOQ**
3	Input Ac Supply	
	a) Voltage	3φ-4wire, 415V AC, ±10%
	b) Frequency	
	c) Power Factor	≥ 0.8 at rated load at minimum input
4	Type of Rectifier	3φ, Full wave-controlled bridge, Silicon Controlled Rectifier
5	Reference Standard	As per IEC - 60146
6	Automatic voltage regulator type	Static control, constant voltage current limit
7	Output DC	
	a) Auto Float voltage (Nominal)	As recommended by battery manufacturer for 12V VRLA Battery (Same to the load)
	b) Output continuous current	As per rating / SOR

	c) Manual Boost voltage Adjust (Through potentiometer)	As recommended by battery manufacturer 12V VRLA Battery
	d) Battery charging current Adjust (Through potentiometer)	As recommended by battery manufacturer 12V VRLA Battery
8	Auto / Manual feature	To be provided
9	DC Volt regulation from no load to full load	±1% of set value across filter capacitor
10	Maximum ripple content at rated load	≤ 1% RMS without battery connect
11	Efficiency at rated load nominal input	≥ 80%
12	Rectifier input Transformer (IS-11171)	Dry type Isolation Transformer of suitable rating is required.
13	**Protections & Controls**	
	a) Output soft start feature	To be provided
	b) DC Over load	110% for short time
	c) Blocking Diode at FCBC output	To be provided
	d) Input & Output	MCB/MCCB
	e) Battery	MCCB
	f) Short circuit	To be provided
	g) DC Over volt, Output current limit & Battery current limit	To be provided
	h) Input under/over volt, Over load	To be provided
	i) Snubber circuit for Thyristor	To be provided
14	Battery Type	12V, SMF-VRLA
15	Measuring instruments	Analog Meter, Flush mounted, 90° Scale, 96Sqmm, Accuracy Class 1.0 a) AC Voltmeter b) DC Output Voltmeter (FCBC/Battery) c) DC Output Ammeter d) Battery Ammeter

16	Indications & alarms with Window annunciation	a) RYB Healthy b) Output ON c) AC under/Over voltage d) Charger on Float e) Charger on Boost f) DC Under Voltage g) DC Over Voltage h) AC Over load i) Mains unhealthy j) DC earth fault k) FCBC fault l) Overload m) Battery Under Voltage
18	Potential free contacts for remote signaling	Potential free 'NO' relay contacts for DC Charger fault, Common alarm
19	Transducers for remote monitoring	To be provided as approved
20	Internal wiring	FRLS PVC
21	Enclosure	IP 42 according to IEC 60529, Powder Coated RA 7032 or approved shade with forced Air ventilation.
22	Ripple Voltage	Less than 1% without Battery connected
23	Automatic voltage regulation	Static control with constant voltage & constant current limit.
24	Filter	Input side line filter
25	Overload Capacity	Capable of withstanding 110% overload for short duration
26	Charging	Automatic Float & Boost charging selection as per battery charging state (voltage level). Facility of Constant Voltage (Adjustable) & constant current(adjustable) boost
27	Mode selection switch	Selector switch For Float / boost and Auto / Manual
28	Type, control technology of Rectifier	The circuit should be conventional SCR based, fully wave rectifier
29	Efficiency	≥ 80% at rated load and nominal input voltage
30	Input Harmonics	As per IEEE 519 (Total demand distortion not more than 5.0%)
31	**Protective Features**	
a	Input Mains	Mains Over voltage, under voltage, phase failure
b	Charger DC Output	Over voltage, short circuit, overload, over temperature
c	Blocking Diode	In the event of AC input failure, to avoid reverse drainage of battery in to the system
d	Battery	Under voltage at battery terminal, Battery over charge, Battery Over current

e	Rectifier & Battery charger	Maximum current limiting, over temp. Trip, Boost charging and float charging current limiting with backup protection against overcharging.
f	Input and output control	Suitable breakers to be provided
g	Fuses	Suitable fuses to protect the system wherever is required
h	PIV of Thyristers (Peak Inverse voltage)	Min.1200V

13.1.4 Environmental Conditions:

The Float cum boost charger shall be designed and constructed for continuous operation at full load under the climate and environment conditions as described in the specification. The FCBC shall be installed in Electrical / Control room buildings / any other location as approved and shall be designed for non-air-conditioning ambient.

13.1.5 Components and Conditions:

i. The Contractor has to take care that all components and equipment are selected considering easy maintenance, simple and quick diagnosis and long maintenance intervals. All components and equipment shall be designed for continuous duty at rated load and under the given climate conditions. Standard industrial high-performance systems and components shall be used as far as Possible. Components and equipment of same kind and type shall be selected for equivalent functions. The interchangeability must be guaranteed.

ii. FCBC system shall be free from workmanship defects. Sharp edges, nicks, scratches, burs etc.., all fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional.

13.1.6 Tagging:

All components, equipment and installations shall receive the respective tagging plates, labels, etc., which have to be of extremely durable material resistant against the environmental conditions. Tagging plates or labels on fronts of enclosures shall be fixed with screws. For further requirements, reference is made to specification. All wiring inside the FCBC shall be neatly arranged & ferruled.

13.1.7 Basic Particulars for Design:

i. Suitable for industrial application.
ii. The rating of the system shall be as per Schedule of Rates at ambient specified in design Basis/Data sheet.
iii. Charger rectifier shall be 6-Pulse SCR based.
iv. Standalone system with auto/Manual Float boost changeover to Battery bank as per data sheet, Schedule of rates and drawing.
v. The load shall normally be fed from the FCBC in float mode.
vi. Battery shall be suitable to maintain the DC power supply to load in the event of mains failure or Charger failure.
vii. Contactor logic to be provided to avoid boost voltage appearing across load as per the configuration, without interruption to the load in the event of Charger failure.
viii. Panel illumination to be provided.
ix. Acoustic noise level at a distance of 1mtr from FCBC panel shall not exceed 75dBA.

x. All wound elements shall be copper wound.
xi. Isolation Transformer shall be provided as approved.
xii. Total Harmonic Distortion (THDi) at input shall not greater than 5%.

13.1.8 Permissible Variations:

FCBC input supply from EB source: - Voltage: +10% & -10% of nominal & Frequency +/ 5% DC Load Voltage while delivering at its rated capacity: - Voltage: ±10%

13.1.9 Protective Features, Indications & Alarms:

i. PROTECTIVE FEATURES:

a) Input -Mains Over voltage, under voltage, Phase failure.

b) Rectifier - Under/Over voltage, Float/Boost mode, Charging current limit, short circuit, overload, over temperature.

c) Battery - Under voltage, Battery over charge, DC Earth Fault.

ii. INDICATIONS & ALARMS:

Following indications & alarms for faults and status shall be provided in window annunciator on front panel as minimum.

a) Mains Fail, Mains Over/Under voltage
b) Charger Fail, Over/Under voltage
c) FCBC Overload
d) Load on battery
e) Battery Over/under voltage
f) Battery low
g) Battery earth fault
h) Load on Battery
i) Battery charging on Auto/Manual mode.
j) Battery on Float/Boost
k) Over Temperature

Analogue Panel Metering (96x96mm size) shall be provided for Charger parameters as minimum for the following. Input AC Voltage with selector switch, Output DC Voltage, current Battery current and voltage etc.

Above list is indicative actual requirement of Indications & Alarms etc will be finalized as per requirement.

iii. AUDIBLE ALARMS WITH Mains Failure, Battery Low, FCBC Fail, FCBC Under-voltage, Over-voltage, Over Temperature, FCBC Overload etc to be provided as approved.

13.1.10 Transformer (Input Isolation Transformer):

Rating suitable for the application & as per IEC726/IS-1171. It is to be Dry type, copper conductor

with class 'H' insulation. Transformer must be double wound and galvanically isolated from input supply.

13.1.11 Rectifier / Battery Charger:

a. Primary input circuit breakers (MCB/MCCB) to feed rectifier.
b. The rectifier circuit should be SCR based Phase controlled.
c. Transient and surge protection circuit in input circuit to protect charger from surges and Voltages Spikes.
d. Charger size shall be based on the maximum load current and recharging current (in maximum time of 10 hours after discharge).
e. Necessary smoothing Chokes and filters.
f. Automatic boost and float charging control.
g. Protective features like Maximum current limiting, Over temp Trip, Boost charging and float charging current limiting with backup protection against overcharging.
h. Charger shall simultaneously supply entire power necessary for DC loads connected and to keep the battery of required capacity in fully charged condition. Provision for automatic charging in both float and boost shall be made.

13.1.12 Charger logic:

a. When AC input supply to the charger is failed, then the battery should automatically connect to load without any interruption.
b. Current limits shall be provided independently for charger load current and battery current.
c. When battery is connected to charger under float mode, the battery current shall be monitored, controlled and limited to the set value automatically.
d. The output voltage shall be limited to maximum of ±10% of nominal system voltage when battery is float charging while feeding the load. Vendor shall specifically ensure that the charger output voltage does not exceed the recommended limits under any fault condition.
e. Silicon diodes to connect at 80% Tap of battery bank shall be provided to maintain continuity of dc supply to load if necessary.

13.1.13 Constructional Features:

a. Unitized construction and shall be manufactured as per IEC:60146, IEC60950.
b. It is free standing, floor mounted, indoor type and complete with all interconnections.
c. Dust and vermin proof. Load bearing parts shall be minimum 2.5mm thick for load bearing parts, 1.6mm for doors and covers.
d. Units shall be self-contained and serviceable.
e. The arrangement and layout shall facilitate easy and convenient supervision of system while running as well as quick detection of disturbances and troubleshooting.
f. Copper earth bus bar shall run throughout the length of Panels. All doors & non-current carrying metallic parts shall be suitably earthed.

13.1.14 Enclosure and Ventilation: Enclosure are to be conforming to minimum IP-42 class and Units shall be provided with cooling fans.

13.1.15 Battery unit:

a. Ampere-hour capacity of the battery shall be selected on the following basis: Nominal of battery bank voltage: as approved with minimum of **2 Hrs backup** and Minimum end cell voltage shall be 1.75V per cell for SMF-VRLA battery.
b. The scope also involves supply, installation and commissioning of Battery Banks –SMF-VRLA, 12V battery modules along with battery stands, terminal connections and cabling from FCBC to battery banks. Battery Bank shall be capable of delivering required 2Hrs backup at rated load. Battery sizing calculation to be submitted for BARC approval.
c. Stationery batteries of type as per data sheet/specification complete with all required accessories as applicable including but not limited to the following shall be supplied with each battery set.
   i. Battery stands shall be as per battery manufacturer's standard shall be provided.
   ii. Cell testing voltmeter complete with leads - (1 no. Per set).
   iii. Spanner (1 no. Per set).
   iv. Battery isolation unit in sheet steel enclosure shall be provided near to battery bank.

13.1.16 Drawing and Documents:

i. Contractor shall submit GA & SLD showing major components / configuration, Battery sizing calculation, Battery bank GA/stand size, FCBC panel size, BOM,, Schematic Wiring diagram, Control & Protection philosophy, List of indication & audio alarms etc to be submitted for approval.
ii. Final drawings, operation & maintenance manual and erection instructions to be submitted.

13.1.17 Inspection & Testing:

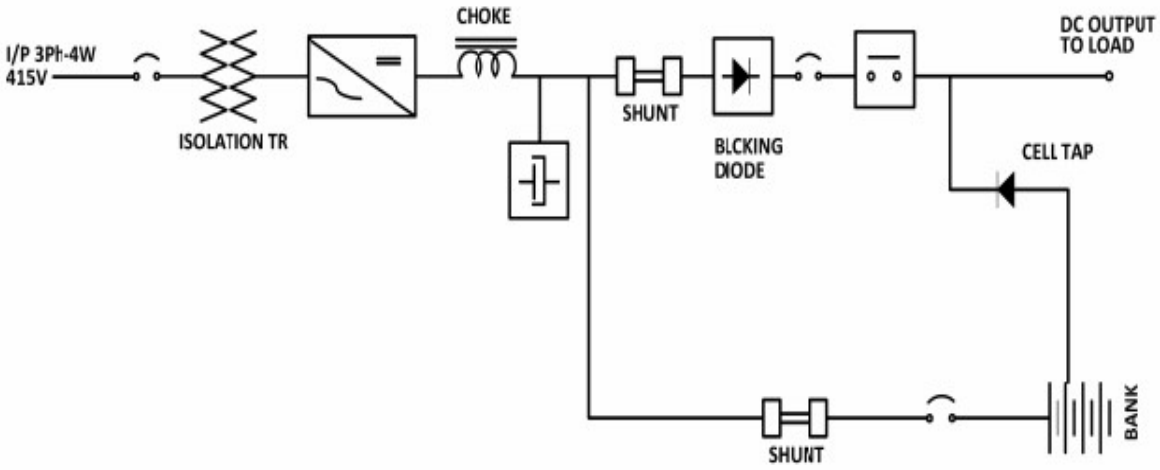
i. Inspection and testing of equipment's shall be carried out by BARC/ BARC nominated inspection agency at the Manufacturer's works prior to dispatch on final product to ensure conformity of the same with acceptable criteria of technical specifications, approved drawings and national/international standards.
ii. The inspection for FCBC systems & Battery Bank shall be as per 100%.
iii. The Contractor shall submit Quality Assurance plan (QAP).
iv. Final acceptance testing along with the batteries shall be done at site. Site acceptance test procedure shall be submitted by the contractor along with QAP.

13.1.18 Spares to be supplied with UPS:

Contractor shall supply following Spares without any extra cost for both UPS together.

1. For each kVA – 1 No's of UPS cards for each kVA.
2. 2 No's of additional batteries for each kVA rating.

13.1.19 SLD:



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13.2 Specifications for

SOQ 17.03 -Part-3 Electrical SITC of 2 X 20 kVA Double conversion, Parallel redundant UPS system with Batteries – Battery Backup of 2 Hrs.
SOQ 17.04 -Part-3 Electrical SITC of 2 X 50 kVA Double conversion, Parallel redundant UPS system with Batteries – Battery Backup of 2 Hrs.

13.2.1 Scope of the work:

The intent of this specification is to define the requirements of uninterrupted power supply system, Rectifiers, Inverter system and the associated battery sets etc.
Tenderer's scope of work Includes design, manufacture, testing, Pre dispatch inspection, packing and delivery to site and testing & commissioning of the complete UPS system with static by-pass and battery banks etc.., as per this specification, data sheet.

13.2.2 Standards:

i. In general, the equipment covered by this specification shall, unless otherwise specified, be in line with the requirement of any of the latest applicable standards of
    a) Bureau of Indian Standards
    b) International Electro Technical Commission
ii. Wherever the requirements in this specification are in conflict with any of the above Standards, the requirements under this specification shall be binding.
iii. In case any contradiction between various referred standards/specification/data sheets and statuary regulation etc.., the following order of priority shall be governing.
    i. Schedule of rate
    ii. Data sheet
    iii. Standard specification
    iv. Codes & standard

13.2.3 General Requirements & Technical Parameters:

Rating	As per SOQ
Application	Industrial Application
Input	3 Phase LT,50Hz with allowable fluctuations
Output	Single Phase LT, 50Hz
Cables	As per approval – If the suitable size is not available contractor shall arrange the cables without extra cost Cables shall be FRLS
Type	Online, 100% parallel redundant type with static bypass as approved. True online double-conversion technology with high

	power density, utility frequency independence, and generator compatibility	
Rectifier	IGBT based Space Vector PWM Converter	
Inverter	IGBT based PWM Inverter	
Display & Monitoring	LCD Display	
Reference Standard	Safety, EMC, Performance - IEC / EN 62040-1,2,3	
Isolation Transformer	Dry type Isolation Transformer of suitable rating is required.	
Power Factor (Input)	≥ 0.98 at nominal input voltage & full load.	
Input Current Harmonics (THDi)	≤ 5.0% (Input Voltage THD<1% and at rated input voltage)	
Bypass	Nominal Input Voltage	230V AC, 1Ø - 2 wire
	AC Power Connection	1Ø - 2 wire + Ground
	Voltage Range	± 10%
Battery	Battery Type	12V, SMF-VRLA
	Nominal Voltage & Ah	As per approved Design fro Back up of 2 Hrs
	Battery Charging Type	Float / Boost (Constant Voltage & constant current mode boost charging with Auto & manual selection)
	Battery Charging Current	10% of AH capacity
Output	Voltage	230V AC, 1Ø - 2 wire + Ground, Pure Sinusoidal
	Voltage, Frequency Regulation	Apprx. ± 1% (Individual unit), ± 2% (in parallel condition) Frequency ± 0.5% free running, 1Hz / sec Slew rate
	Rated Power Factor	0.8 lagging
	Voltage Distortion	≤2% for linear loads, ≤5% for Non-linear loads (as per IEC 62040-3)
	Crest Factor	as per IEC 62040-3)
	Inverter	≥ 90% at rated load

	Efficiency	
	Inverter Overload Capacity	> 100% to 125% for 10 minutes > 125% to 150% for 01 minute
	Inverter Voltage Transient	±5% rms (Min. Load: 20%. Transient load: 80%) (As per IEC 62040-3)
	Recovery Time	≤ 40msec to within ±1% of nominal voltage (As per IEC 62040-3)
	Fuse clearing Capability	20% of UPS nominal current rated fuse (IEC 60269) by inverter within the specified time based on fuse characteristics. With bypass available & battery connected. Fuse can be cleared by the bypass.
User Interface	Parameters in LCD Display	Input : Voltage, Frequency, Current, Power Battery : Voltage, Current Bypass : Voltage, Frequency Output : Voltage, Frequency, Current, Power, Load%
	Status indications in LCD	Like - Input Healthy, Converter ON, Converter Trip, Load on Battery, Inverter ON, Inverter Trip, Load on UPS, Load on Bypass, Bypass Healthy, Over Temperature etc as approved
	Protection & Alarms	Like Converter ON, Input UV/ OV, Converter Trip, Load on Battery, Battery Low, Inverter Trip, Output UV / OV, Overload, Load on Bypass, Inverter Async, Over Temperature, System Fault, Short Circuit etc as approved
	Communication Interface	RS 485 MODBUS Protocol
Mechanical	Degree of Protection	Min IP 42 according to IEC 60529
	Paint Shade	Powder coated paint RAL 7032 or approved shade
	Cable Access	Bottom Front

	Cooling	Forced Air
Isolation Transformer	Input Isolation Transformer of suitable rating must be provided at the incomer of each UPS	
System fault level	Min 10 KA for 1 sec	
Type of Converter & inverter	The Converter & Inverter circuit should be IGBT based, fully microprocessor controlled with PWM Technology or Latest proven technology.	
Inverter Overload Capacity	>100% to 125% for 10 minutes >125% to 150% for 01 minute 200% for 200 msec.	
Mode of operation	Dual/parallel Redundant with static bypass & Dual Redundant rectifier, inverters as specified in SOR/Design basis/Block diagram.	
Inverter efficiency	≥ 90% at rated load	
Overall efficiency	>85%	
Input Harmonics	As per IEEE 519 (Total demand distortion not more than 5.0%)	
Rectifier/Charger		
Input	415 V (+) 10% & (-) 10%, 3P-3W, 50Hz ±5%,	
Output DC voltage/Load	Suitable for SMF-VRLA battery Wattage of Charger shall be designed by considering boost charging of Battery bank @ C/10 capacity & simultaneously taking care of Output load requirements.	
Overload Capacity	125% minimum for 10 min 150% minimum for 1 min	
Inrush current	Limited by soft-start circuit	
Output voltage tolerance	+/- 1%	
DC voltage ripple	<1% with battery connected <2 % Without battery connected	
Rectifier	IGBT Based PWM technology with input power factor controlled	
Filter	Input side line filter	
Input current THD (Total Harmonic Distortion) at nominal load	As per IEEE-519 (input Voltage THD<1%, largest single voltage harmonics <3%, Total demand distortion <5%)	

Charging	Automatic Float & Boost charging selection as per battery charging state (voltage level). Facility of Constant Voltage (Adjustable) & constant current(adjustable) boost charging mode @C/10 AH capacity of battery rating shall be designed by Vendor
Bypass Static	
Automatic Bypass	Static bypass to provide an uninterruptible transfer of load in case of failure of any system component or malfunctioning or overload & the load shall return on the UPS when the malfunctioning or overload is cleared.
Voltage/ Freq/Phase	230V ± 10% AC, 50Hz. ± 5%, Single Phase 2 wire
Input connection	Separate for each UPS (common mains supply from EB)
The switching time from inverter to bypass & vice versa	No break type
Manual/Maintenance Bypass	Switch/Isolator
Overload on bypass	150% (minimum) for (1 min, 125% (minimum) for 15 min.
Battery Bank	
Type of Battery	12V SMF-VRLA Batteries
Battery Capacity	As per approved design
I. Battery end cell voltage II. Battery stand formation III. Battery backup time	1.75V/cell Suitable MS stand with acid resistant painted. 2Hrs at 100% of UPS rating at 0.8PF (for each Bank). The rectifier/charger output current & voltage shall be limited as per battery manufacturers recommendation.
Alarms, Indications and LCD Display	
Single line power Flow diagram (Mimic diagram) in LCD display to Indicate UPS status (i.e., Main's present, battery charging & discharging, low battery voltage and unit on bypass, unit on Battery etc.,).	
Indications & metering	Digital panel Meter with LCD display shall be provided for monitoring viz. a) Input AC voltage, current, frequency b) Output AC voltage, current, frequency c) Battery Current and voltage d) Mains ON/OFF, Mains Over/under voltage, phase fail e) Inverter ON/OFF, Inverter Over/Under voltage,

	Inverter overload, over heat & load in % on inverter. f) Battery voltage low, battery level in % & battery fault. g) Battery Operation Boost Charge, Float Charge with of status - "in Charge" or "Discharge" h) Load on bypass or inverter. Detailed UPS status with Operation/faults history.
Audible Alarms with LCD Display	a) Mains Failure b) Battery Low c) UPS fault (Continuous) d) Inverter Under-Voltage e) Over Temperature (Continuous) Inverter Overload (continuous)
Communication Interface	RS 485 Modbus Protocol
Protective Features	
Input	Mains Over voltage, under voltage, phase failure
Inverter	Over voltage, short circuit, overload, over temperature
Battery	Under voltage, Battery over charge, Battery Over current
Rectifier & Battery charger	Maximum current limiting, over temp. Trip, Boost charging and float charging current limiting with backup protection against overcharging.
Battery monitoring System	Yes, with communication & provision to interface with SCADA
Provision for Auto/Manual selection	Required for Float and Boost mode operation
Provision for Float/boost mode selection	Required for Float and Boost mode operation

13.2.4 Environmental Conditions:

The uninterrupted power supplies shall be designed and constructed for continuous operation at full load under the climate and environment conditions as described in the specification / Purchaser Data. The UPSs shall be installed in Electrical / Control room buildings and shall be designed for non-air-conditioning ambient.

13.2.5 Components and Conditions:

a) The Contractor has to take care that all components and equipment are selected considering easy maintenance, simple and quick diagnosis, and long maintenance intervals. All components and equipment shall be designed for continuous duty at rated load and under the given climate conditions. Standard industrial high-performance systems and components shall be used as far as Possible. Components and equipment of same kind and type shall be selected

for equivalent functions. The interchangeability must be guaranteed.

b) UPS system shall be free from workmanship defects. Sharp edges, nicks, scratches, burs etc., all fasteners shall be fixed properly. The equipment shall be complete with all parts and all parts shall be functional.

13.2.6 Tagging:

All components, equipment and installations shall receive the respective tagging plates, labels, etc., which have to be of extremely durable material resistant against the environmental conditions. Tagging plates or labels on front of enclosures shall be fixed with screws. For further requirements, reference is made to specification. All wiring inside the UPS shall be neatly arranged & ferruled.

13.2.7 Basic Particulars for Design:

- Suitable for industrial application.
- Microprocessor based online UPS with static bypass.
- The rating of the system shall be as per Schedule of Rates at 0.8 of lagging at ambient specified in design Basis/Data sheet.
- 125% of the rated output for 10 minutes & 150% for 1 minute.
- Rectifier & Inverter switching device shall be IGBT based.
- Dual/Parallel redundant system with automatic static bypass, Battery bank as per data sheet, Schedule of rates and drawing.
- The load shall normally be fed from the inverters.
- Battery shall be suitable to maintain the power supply in the event of mains failure or battery charger failure for time period as indicated in Schedule of Rates/specification.
- Static by pass switch to connect the load to the mains supply, as per the configuration, without interruption to the load in the event of inverter failure.
- Panel illumination to be provided.
- Noise level at a distance of 1mtr. from UPS panels shall not exceed 65dBA.
- All wound elements shall be copper wound.
- Input and output isolation transformers.
- Total Harmonic Distortion (THD) at input shall not greater than 5%.

13.2.8 Permissible Variations:

1) UPS input supply from EB source: -
   Voltage : +10% & -10% or as per SOR & Frequency +/- 5%

2) Output of the uninterrupted power supply system while delivering a load of its rated capacity: -
   Voltage: ± 1%, Frequency: ± 0.5%

3) Bypass input supply from EB source: -
   Voltage : +10% & -10% or as per SOR & Frequency +/- 5%

13.2.9 Protective Features, Indications & Alarms:

1) <u>PROTECTIVE FEATURES:</u>

a) **Input-**
Mains Over voltage, under voltage, Phase failure

b) **Inverter-**
Under/Over voltage, short circuit, overload, over temperature

c) **Battery-**
Under voltage, Battery over charge, Battery Over current, DC Earth Fault

2) <u>INDICATIONS:</u>

Following indication should be provided in front LCD touch screen display panel.

i. Single line Power Flow Diagram (Mimic diagram) showing status of UPS (i.e.. Main's present, Battery charging & discharging, load on inverter and load on bypass, etc.).

ii. Digital panel Metering & indications with LCD display (screen touch) shall be provided for monitoring viz.

a) Input AC Voltage, current, frequency
b) Output AC Voltage, current, frequency
c) Battery current and voltage
d) Mains ON/OFF, Mains Over/Under voltage, Phase fail.
e) Inverter ON/OFF, Inverter Over/Under voltage, Inverter overload, over heat & load in % on inverter.
f) Battery Bank voltage low, battery bank level in % & battery bank fail.
g) Battery modes of operation status like Float/Boost Charge or discharge with of status - "in charge" or "discharge"
h) Load on bypass or inverter.
i) Detailed UPS Status with Operation/faults history. (event logging)

3) <u>AUDIBLE ALARMS WITH LCD DISPLAY</u>

a) Mains Failure
b) Battery Low
c) UPS fault (continuous)
d) Inverter Under-voltage, Over-voltage
e) Over Temperature(continuous)
f) Inverter Overload(continuous)

13.2.10 Transformer (Isolation Transformer for Input & Output):

1. Rating suitable for the application & as per IEC726/IS-1171
2. Dry type, with class 'H' insulation.
3. Input and output isolation transformers shall be provided for galvanic
4. isolation. (As per block diagram).

13.2.11 Rectifier / Battery Charger:

1. Primary input circuit breakers (MCCB) to feed rectifier.
2. The circuit should be latest proven IGBT based fully microprocessor controlled with PWM Technology.
3. The rectifier input must be active power factor controlled and value as specified.
4. Transient and surge protection circuit in input circuit to protect UPS from surges and Voltages Spikes.
5. Charger size shall be based on the maximum inverter input load current and recharging current (in maximum time of 10 hours after discharge). The rating of rectifier / charger shall be not less than the value calculated as follows:

For SMF-VRLA batteries = Inverter input current (Idc) + 0.1Ah (10 hr. rating of battery)

Were,

Inverter input current during charging (idc) = Rated kVA capacity of UPS X load p.f X 1.1 (overload)

Inverter eff. X (No. of cells x Float Cell voltage)

Maximum Inverter Input current(idc) = Rated kVA capacity of UPS X load p.f

Inverter eff. X (No. of cells x End Cell voltage)

Charger Sizing = Charger Current X Charger Voltage (No. of cells x float voltage of cell)

Rectifier efficiency x input PF

6. Necessary smoothing reactor and filters.
7. Automatic boost and float charging control.
8. Protective features
    - Maximum current limiting
    - Over temp,. Trip
    - Boost charging and float charging current limiting with back up protection against overcharging.
9. Charger shall simultaneously supply entire power necessary for inverter (load) and to keep the battery of required capacity in fully charged condition. Provision for automatic charging in both float and boost shall be made.

13.2.12 Inverter (IGBT Technology Based):

1. Input circuit consisting of battery MCCB, battery filter and smoothing reactor.
2. DC/DC converter for voltage control, if required.
3. The circuit should be IGBT based fully microprocessor controlled with PWM Technology.
4. Control & protection electronics.
5. Series reactor and parallel filter.
6. Output isolation transformer.
7. Protection against the following.

- Abnormal output voltage
- Abnormal DC link voltage.
- Over load trip.
- Low battery voltage protection
- Transformer Over temperature.

13.2.13 Static Bypass Switch:

1. Static switch automatically switches the load to the reserve power supply/mains whenever there is failure in inverter supply to the load.
2. Automatic Bypass-static to provide uninterrupted transfer of load in case of any system component or malfunctioning and shall return the load automatically to the UPS when malfunctioning & overload is cleared.
3. The switching time from inverter to bypass & vice versa shall be no break type in synchronized condition.
4. Transfer/Retransfer facility shall be provided in both Auto & Manual mode.
5. Manual bypass switch/isolator shall be provided which allows the electrical isolation of UPS from load for the purpose of maintenance of UPS without disturbance to load.
6. High-Speed fuses shall be provided for protecting the SCRs against accidental overload.
7. Inverter should be phase locked to the bypass AC supply as long as by pass remains within specified frequency range. The frequency should be site adjustable in steps of ±1Hz.

13.2.14 Constructional Features:

1. Unitized construction and shall be manufactured as per IEC:62040, IEC60950
2. Free standing, floor mounted, indoor type and complete with all interconnection.
3. Dust and vermin proof, Sheet steel clad, Minimum 2.5mm thick for load bearing parts, 1.6mm for doors and covers.
4. Units shall be self-contained and serviceable.
5. The arrangement and layout shall facilitate easy and convenient supervision of the unit while running as well as quick detection of disturbances and troubleshooting.
6. Copper earth bus bar shall run throughout the length of Panels. All doors & non-current carrying metallic parts shall be suitably earthed.

13.2.15 Enclosure and Ventilation:

- Enclosure conforming to minimum IP-42 class.

- Units shall be provided with cooling fans.

13.2.16 Battery unit:

Ampere-hour capacity of the battery shall be selected on the following basis:

a) Load Power factor of 0.8
b) **Backup time of minimum 2Hrs.**
c) Nominal of battery bank voltage: **as per approved design**

The scope also involves supply, installation and commissioning of Battery Banks SMF-VRLA battery modules along with battery stands, terminal connections and cabling from UPS to battery banks. Each UPS will have Separate Battery Bank capable of delivering backup time as per specification at full load at 0.8 power factor. Battery sizing calculation to be submitted along with the bid.

Important Note- Type and Voltage of Batteries shall be as per approved design during the approval stage.

Stationery batteries of type as per data sheet/specification complete with all required accessories as applicable including but not limited to the following shall be supplied with each battery set.

a) Battery stands shall be as per battery manufacturer's standard shall be provided.
b) Cell testing voltmeter complete with leads - (1 no. Per set).
c) Spanner – (1 no. Per set).
d) Battery isolation unit in sheet steel enclosure shall be provided near to each battery bank.

13.2.17 Drawing and Documents:

The following documents shall be submitted:

a) data sheets
b) GA & SLD showing major components / configuration.
c) List of recommended spares.

The following calculations / dimensions shall be submitted for approval:

d) Battery sizing calculation.
e) Battery bank GA/stand size.
f) UPS panel size.

The following drawings shall be submitted for approval

g) G.A of UPS system including dimensions.
h) Battery bank GA including dimensions.
i) Major Bill of Material.
j) Charger sizing calculation.
k) Battery sizing calculation.
l) Schematic & Wiring diagram for reference.
m) UPS Control & Protection philosophy.
n) List of LCD indication & audio alarms.

Final drawings, operation & maintenance manual and erection instructions to be submitted along with dispatch of equipment's in 2Sets in hard copy & 2 sets in soft copy (CD).

13.2.18 Inspection:

Inspection and testing of equipment's shall be carried out by BARC/ BARC nominated inspection agency at the Manufacturer's works prior to dispatch on final product to ensure conformity of the same with acceptable criteria of technical specifications, approved drawings and national/international standards. The Inspection for UPS Systems, Rectifiers & Battery Banks shall be 100%.

The Contractor shall submit Quality Assurance plan (QAP) for respective equipment's QAP shall be prepared and furnished by the contractor along with their internal in process quality checks to BARC.

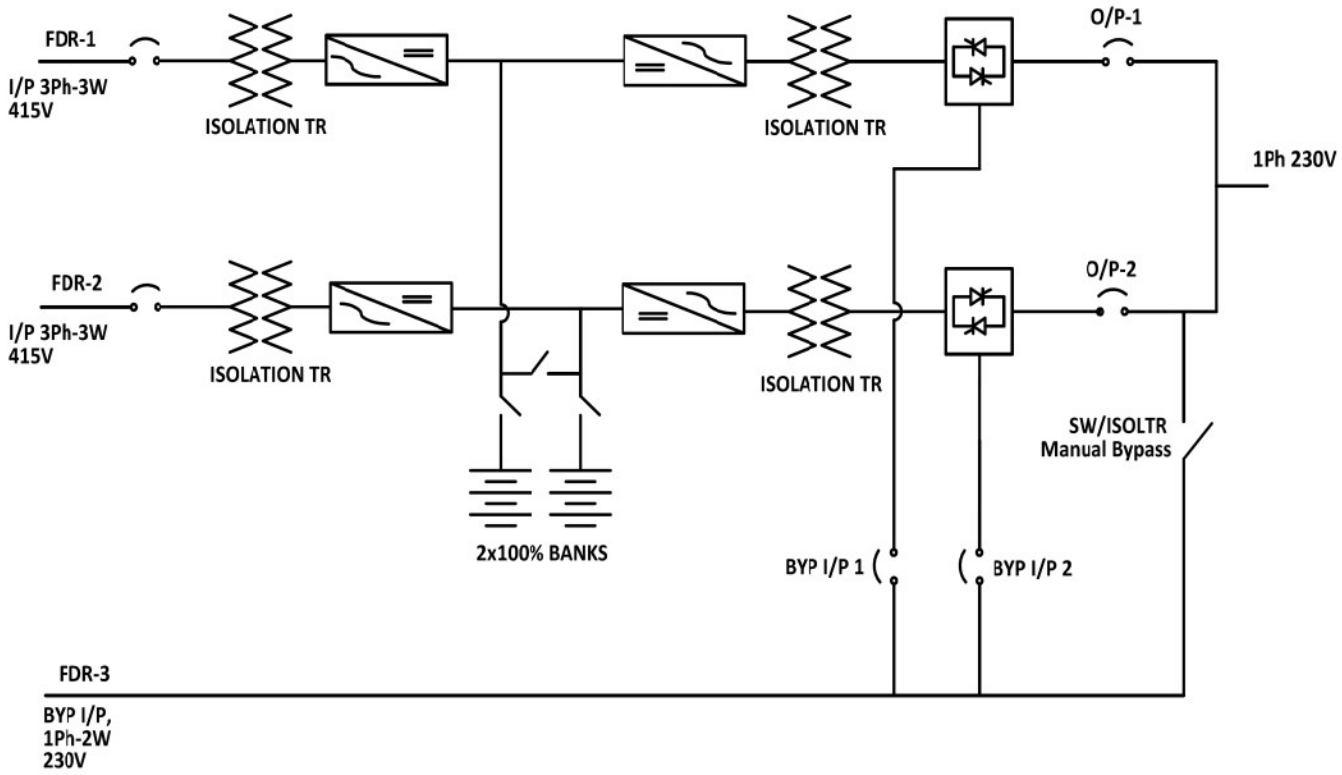
Final acceptance testing along with the batteries shall be done at site. Site acceptance test procedure shall be submitted by the contractor along with QAP.

13.2.19 Spares to be supplied with UPS:

Contractor shall supply following Spares without any extra cost for both UPS together.

i. For 20kVA, 50kVA – 1 No's of UPS cards for each kVA.
ii. 2 No's of additional batteries for each kVA rating.

13.2.20 SLD:


FDR-1
I/P 3Ph-3W
415V
ISOLATION TR
ISOLATION TR
O/P-1
1Ph 230V
FDR-2
I/P 3Ph-3W
415V
ISOLATION TR
ISOLATION TR
O/P-2
SW/ISOLTR
Manual Bypass
2x100% BANKS
BYP I/P 1
BYP I/P 2
FDR-3
BYP I/P,
1Ph-2W
230V

-----END---

Government of India
Bhabha Atomic Research Centre, Mysuru
Proj. SMF Challakere, Chitradurga

Ref.: BARC/SMFC/FMF/2024/LTSS/NIT/Cl-2 05.02.2026

Name of the Tender: Composite work of SITC of Electrical Systems and Design & Construction of civil works in Substations at SMFC, BARC, Challakere, Karnataka for:

A. SITC of 2 X 2.5 MVA, 11/0.433 kV LT substation with HT & LT Panels; HT & LT Cables; 2 Nos. of 750 kVA, 0.433 kV DG including design & construction of civil structures for new Substation building-1, cable trenches, finishing works and associated electrical works.
B. SITC of 2 X 2.5 MVA, 11/0.433 kV LT substation with HT & LT Panels; HT & LT Cables; including construction of balance civil works in an existing Substation building-2, cable trenches, finishing works and associated electrical works''.

Tender No.: BARC/SMFC/FMF/2024/LTSS/NIT; dt.: 23-12-2025.

CPP Portal Tender ID.: 2025_BARC_891245_1

Additional Clarifications and Specifications Raised by Bidders:

1. **With reference to the above tender, all bidders are requested to note the following clarifications**

Financial Bid, PART-III, Electrical works, BOQ Sl. No -8 (8.01 to 8.06) (SITC of 11kV (UE) HT Cable, Joint Kit and Termination Kit)	Cable size shall be 3C X 240Sqmm 11kV (UE). Specifications as mentioned in Section-V(iv) Electrical Part

2. These clarifications shall form a part of the tender document. It shall be deemed that all bidders who submit their bids have read and accepted the pre-bid clarifications.

3. Bidders are requested for submission of bid within the above-mentioned period. No further extension will be entertained.

4. All other tender conditions remain unchanged.

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