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1.0	SCOPE	This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading of Thyristor Based Battery Charger (FC & FCBC) with DCDB suitable for VRLA batteries of 24V & 48V of 150 AH & 200 AH respectively at site/ stores complete with all accessories for efficient and trouble free-operation. It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to TPCODL/TPNODL/TPSODL/TPWODL, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.																				
2.0	APPLICABLE STANDARDS	The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest editions of the following Indian/International standards and shall conform to the regulations of the local statutory authorities. <table><tr><td>IS 6619: 1972</td><td>Safety Code for Semi-conductor Rectifier Equipment</td></tr><tr><td>UL 1564</td><td>UL Standard for Safety Industrial Battery Chargers</td></tr><tr><td>IEC 61000-4-17</td><td>Electromagnetic compatibility (EMC) – Part 4-17: Testing and measurement techniques – Ripple on DC input power port immunity test</td></tr><tr><td>IEC 62133 II Edition</td><td>Rechargeable Cell/Battery Safety</td></tr><tr><td>IEC 62281</td><td>Safety of primary and secondary lithium cells and batteries during transport</td></tr><tr><td>IEC 62619</td><td>Safety requirements for secondary lithium cells and batteries, for use in industrial applications</td></tr><tr><td>IEC 61000-4-2</td><td>Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test</td></tr><tr><td>IS-13947-1993 (Part 1 to 5)</td><td>Low voltage switchgear and control gear</td></tr></table>			IS 6619: 1972	Safety Code for Semi-conductor Rectifier Equipment	UL 1564	UL Standard for Safety Industrial Battery Chargers	IEC 61000-4-17	Electromagnetic compatibility (EMC) – Part 4-17: Testing and measurement techniques – Ripple on DC input power port immunity test	IEC 62133 II Edition	Rechargeable Cell/Battery Safety	IEC 62281	Safety of primary and secondary lithium cells and batteries during transport	IEC 62619	Safety requirements for secondary lithium cells and batteries, for use in industrial applications	IEC 61000-4-2	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	IS-13947-1993 (Part 1 to 5)	Low voltage switchgear and control gear		
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		7	Altitude above MSL not exceeding	1000m																																			
		8	Wind Pressure	300 Km/hr																																			
		9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g																																			
		10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)																																			
		11	Average Thunderstorms prevailing in the area	90 days per annum																																			
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		TPCODL/TPNODL/TPSODL/TPWODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed up to 300 Km ph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.																																					
4.0	GENERAL TECHNICAL REQUIREMENTS	<table><tr><th>S. No.</th><th>Parameters</th><th colspan="2">TPCODL/TPNODL/TPSODL/TPWODL Requirements</th></tr><tr><td></td><td></td><td>48 V/200AH</td><td>24V/150AH</td></tr><tr><td>A</td><td>Battery Charger</td><td></td><td></td></tr><tr><td>1.</td><td>AC input voltage</td><td>415 V ± 20% AC, 3 Phase, 4 Wire</td><td>415 V ± 20% AC, 3 Phase, 4 Wire</td></tr><tr><td>2.</td><td>AC input frequency</td><td>50 Hz ± 5 %</td><td>50 Hz ± 5 %</td></tr><tr><td>3.</td><td>DC Output Current rating</td><td>50 A</td><td>40 A</td></tr><tr><td>4.</td><td>DC output voltage settings:</td><td>Nominal: 48V; Range: 48 V DC to 54 V DC for FC Range: 48 V DC to 62V DC for FCBC</td><td>Nominal: 24V; Range: 24 V DC to 27 V DC for FC Range: 24 V DC to 31V DC for FCB</td></tr><tr><td>5.</td><td>Output Voltage Regulation</td><td>± 1 % of set output voltage value for +15% to -15% input voltage variations and for 10-100% of load variations</td><td>± 1 % of set output voltage value for +15% to -15% input voltage variations and for 10-100% of load variations</td></tr><tr><td>6.</td><td>Efficiency</td><td>≥ 90%</td><td>≥ 90%</td></tr></table>	S. No.	Parameters	TPCODL/TPNODL/TPSODL/TPWODL Requirements				48 V/200AH	24V/150AH	A	Battery Charger			1.	AC input voltage	415 V ± 20% AC, 3 Phase, 4 Wire	415 V ± 20% AC, 3 Phase, 4 Wire	2.	AC input frequency	50 Hz ± 5 %	50 Hz ± 5 %	3.	DC Output Current rating	50 A	40 A	4.	DC output voltage settings:	Nominal: 48V; Range: 48 V DC to 54 V DC for FC Range: 48 V DC to 62V DC for FCBC	Nominal: 24V; Range: 24 V DC to 27 V DC for FC Range: 24 V DC to 31V DC for FCB	5.	Output Voltage Regulation	± 1 % of set output voltage value for +15% to -15% input voltage variations and for 10-100% of load variations	± 1 % of set output voltage value for +15% to -15% input voltage variations and for 10-100% of load variations	6.	Efficiency	≥ 90%	≥ 90%	
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		6.	Efficiency	≥ 90%	≥ 90%																																		

		7.	Power Factor	≥ 0.98	≥ 0.98
		8.	Ripple voltage	$\leq 200\text{mV (P-P)}$	$\leq 200\text{mV (P-P)}$
		9.	Galvanic Isolation	The rectifier stage must have galvanic isolation	The rectifier stage must have galvanic isolation
		10.	Switchgear:		
			a) input side (AC)	4 pole, 25A/20 kA or suitable size MCCB	4 pole, 25A/20 kA or suitable size MCCB
			b) output side (DC)	2 pole, 100A MCCB suitable for DC operation	2 pole, 100A MCCB suitable for DC operation
		11.	Protections	a) Surge suppressors	a) Surge suppressors
				b) Soft start	b) Soft start
				c) Battery charger current limit	c) Battery charger current limit
				d) Control circuit & Voltmeter fuses	d) Control circuit & Voltmeter fuses
				e) Rectifier protection	e) Rectifier protection
				f) Blocking diode	f) Blocking diode
				g) Under voltage & over voltage	g) Under voltage & over voltage
				h) Short circuit and Overload	h) Short circuit and Overload
				i) Thermal protection (Fire safety protection)	i) Thermal protection (Fire safety protection)
				k) Wrong battery connection/reverse polarity	k) Wrong battery connection/reverse polarity
				l) Battery Earth Fault	l) Battery Earth Fault
				m) POWER ON self test	m) POWER ON self test
				n) Supply wrong phase, phase failure	n) Supply wrong phase, phase failure
		12.	Operating temperature	0°C to 55°C	0°C to 55°C
		13.	Bus bars (copper)	Suitable size for carrying 100 A (min.) current.	Suitable size for carrying 100 A (min.) current.
		14.	Connection to back-up battery bank, load and battery at site	through dedicated MCBs via bus-bar-	through dedicated MCBs via bus-bar-
		15.	Mounting arrangement	Cabinet/ rack	Cabinet/ rack
		16.	Ingress Protection	IP 42	IP 42
		17.	Cooling arrangement	suitable cooling arrangement (natural / forced air with fan) should be provided	suitable cooling arrangement (natural / forced air with fan) should be provided

		18.	Alarms (at LCD display of Battery Charger (FC & FCBC)	AC Mains Fail/MCB trip (at charger input)	AC Mains Fail/MCB trip (at charger input)
				DC Fail/MCB trip (at charger output to load)	DC Fail/MCB trip (at charger output to load)
				DC Fail/MCB trip (at charger output to battery)	DC Fail/MCB trip (at charger output to battery)
				AC under-voltage -	AC under-voltage -
				AC over-voltage	AC over-voltage
				DC load under-voltage	DC load under-voltage
				DC load over-voltage	DC load over-voltage
				Charger Under Voltage	Charger Under Voltage
				Charger Over Voltage	Charger Over Voltage
				Fault at rectifier module-	Fault at rectifier module-
				Battery Earth Fault	Battery Earth Fault
		19.	LED indications	Charger ON (Green)-	Charger ON (Green)-
				Charger fail -Alarm (Red)	Charger fail -Alarm (Red)
				Charger over temperature (Red)	Charger over temperature (Red)
				Charger under voltage (Red)	Charger under voltage (Red)
				SCR Fuse Fail (Red)	SCR Fuse Fail (Red)
				AC mains ON (Green)	AC mains ON (Green)
				AC mains Fail (Green)	AC mains Fail (Green)
				Float ON (Green)	Float ON (Green)
				Boost ON (in FCBC Only)- Amber	Boost ON (in FCBC Only)- Amber
				Phase Failure/wrong phase	Phase Failure/wrong phase
				Charge/Discharge	Charge/Discharge
				Charger Overload	Charger Overload
				Output Fail	Output Fail
				Battery Low	Battery Low
		20.	Dimensions (L X B X H) in mm	To be provided by bidder	To be provided by bidder
		B.	Housing Cabinet		

		1.	Movable	Wheels or alternative arrangement for easy movement	Wheels or alternative arrangement for easy movement
		2.	Dimensions (L X B X H)	To be provided by bidder	To be provided by bidder
		3.	Suitable for containing the charger	Yes/ No	Yes/ No-
		4.	Structure	Steel rack/cabinet, painted with anti-corrosive paint.	Steel rack/cabinet, painted with anti-corrosive paint.
		5.	Ingress protection	IP 42	IP 42
5.0	GENERAL CONSTRUCTIONS				
5.1	General	The Battery charger is required for charging the batteries and as a DC conversion unit for supply to the relay units in case of supply failures along with a situation of deep-discharged batteries/ battery failure at any site. The battery charger must have the provision for Float and Boost modes for charging the VRLA batteries. DC Distribution Board : The DCDB shall be floor mounting, integral to battery charger panel. Non-compartmentalized, separate partition shall be provided between battery charger and DCDB. It shall have Moving coil DC voltmeter & DC ammeter of size 96 sq.mm. Incoming 100A DP DC MCCB-1 No, Copper Bus-bar, Outgoing 25A DP DC MCB: 12 Nos. with Feeder 'ON' LED indication. Back-up Battery bank shall be connected to battery charger MCCB/MCB, therefore MCCB/MCB to be considered in Battery charger for back-up battery bank connection for safe disconnection of battery bank in case of O&M activity. General Features : 1. The battery charger with other components and integral DCDB shall be housed in a common cubicle with separate compartments for charger and for DCDB with adapter. The chargers shall be indoor, floor mounted, self-supporting sheet metal enclosed cubicle type. The bidder shall supply all necessary base frames, anchor bolts and hardware. The panel frame shall be fabricated using cold rolled sheet steel of thickness not less than 2.0 mm. Removable undrilled gland plates of at least 3.0 mm sheet steel and lugs for all cables shall be supplied by the bidder. The lugs for cables shall be made of electrolytic copper with tin coat. The charger shall have sufficient vermin proof. Ventilation louvers shall be backed with fine brass wire mesh. All doors and covers shall be fitted with EPDM gaskets which shall be suitable for IP 42). The Chargers shall have hinged double leaf doors. provided on front and/or backside for adequate access to the Charger internals. All the Charger cubicle doors shall be properly earthed. The degree of protection of Charger enclosure shall be at least IP-42. 2. Conformal coating on all electronics components to be considered. 3. All indicating instruments, control & selector switches and indicating lamps shall be mounted on the front side of the charger.			

4. Electronic equipment shall be of modular design consisting of plug in modules in standard 19 inches metallic racks with metallic card guides. The cards should be provided with proper handles. Card to card wiring should be preferably through a mother board. Unplanned jumpering and track modifications are not permitted. Mechanical interlocks to prevent wrong insertion of cards should be provided. Each card shall have its junction and test points identified. Maintenance aids such as extension printed wiring boards and jumper leads shall be provided.
5. The layout of charger components shall be such that their heat losses do not give rise to excessive temperature within the Charger panel surface. Operating temperature range shall be minus 5°C to plus 60°C. Location of the electronic modules will be such that temperature rise of the location, in no case, will exceed 10° Cover ambient air temperature outside the charger.
6. The float-cum-boost charger shall be suitable for charging 48V battery in addition to trickle charging and feeding power to the communication equipment whenever AC mains supply is available to the charger.
7. In spite of the fluctuations in the voltage and the frequency variation of mains supply to the charger, there must be line regulated DC output voltage for feeding the communication equipment load. The DC output voltage shall also be load regulated.
8. In the event of mains supply failure, the batteries shall supply total load current as long as the battery is not discharged below 40V/20V. A Low Voltage Disconnect (LVD) should protect the battery from deep discharge. On restoration of main supply the float-cum-boost charger shall resume its normal function of charging the battery as well as feeding communication equipment load automatically.
9. Digital Control: charger should employ digital control with DSP controller for providing predictive control of rectification & monitoring capability. The charger should have a multi line dot matrix display of suitable size, on front panel to indicate control status and event log.
10. Lightning Protection: The system shall be adequately protected against lightning at the input.
11. Locking facilities shall be provided as following:
 - (a.) For locking Trickle/Boost selector switch in the trickle position only. This would be used for having key mechanical interlock between Trickle/Boost selector switch and isolator in D.C. distribution board which is being procured separately by the Owner.
 - (b.) The Charger enclosure door locking requirements shall be met by the application of padlocks. Padlocking arrangement shall allow ready insertion of the padlock shackle but shall not permit excessive movement of the locked parts with the padlock in position.

WIRING

- Each Charger shall be furnished completely wired up to power cable lugs and terminal blocks ready for external connection. The power wiring shall be carried out with 1.1 KV grade PVC insulated cables conforming to IS:1554 (Part-I).

The control wiring shall be of 1.1KV grade PVC insulated stranded copper conductors of 2.5sq.mm. Conforming to IS: 694. Control wiring terminating at electronic cards shall not be less than 1.0 sq. mm. Control terminal shall be suitable for connecting two wires with 2.5 sq.mm. Stranded copper conductors. All terminals shall be numbered for ease of connections and identification. At least 20% spare terminals shall be provided for circuits.

- Power and control wiring within panels shall be kept separate. Any terminal or metal work which remains alive at greater than 415 V, when panel door is opened, shall be fully protected by shrouding.
- An air clearance of at least ten (10) mm shall be maintained throughout all circuits, except low voltage electronic circuits, right up to the terminal lugs. Whenever this clearance is not available, the live parts should be insulated or shrouded.

AC Terminations

- The input terminal should be single phase or three phases as the case may be cleared marked as R Y B and N and for AC three phase, L and N for AC single phase. AC input termination shall be suitably protected against the accidental touch/contact with the working staff for their protection and shall also have clear and prominent be "Danger" marking.
- Screening shall be provided between AC and DC components to prevent accidents. The AC input connection to the rectifier module shall be by means of locking type plug and socket arrangement.
- All the connection between distribution and modules shall be through proper rated cables only. Fuses and circuit breakers for each module shall be easily accessible and properly rated.

DC Terminations

- The output of each rectifier in the negative load shall be taken through full rated ISI marked MCBs. All the AC, DC control & alarm cabling shall be supplied with the rack. All DC +ve and - ve leads shall be clearly marked.

Battery Temperature Compensation

- The charger shall be provided with the appropriate circuitry to interface with the temperature probe assembly. With the probe, the charger shall automatically compensate gassing and constant voltage setting inversely proportional to the probe's temp/ battery ambient temp., so that over charging at high temperature and under charging at low temperature can be prevented.

Fuses

- All fuses shall be HRC Link type. Fuses shall be mounted on fuse carriers which are in turn mounted on fuse bases. Wherever it is not possible to mount fuses on carriers, fuses shall be directly mounted on plug-in type base. In such case one insulated fuse pulling handle shall be supplied for each charger. Fuse rating shall be chosen by the Bidder depending on the circuit requirement. All fuses in the chargers shall be monitored. Fuse failure annunciation shall be provided on the failure of any fuse.

		Blocking Arrangements - Blocking arrangement shall be provided in the positive pole of the output circuit of the charger to prevent reverse current flow from the DC battery into the charger. Radio Interference - The equipment shall be efficiently screened against interference to radio and also other communication equipment, which may be installed in the same building. All sources of noise shall be filtered if necessary with suppressors generally in accordant with relevant standards.
5.2	Terminals	Separate terminals shall be provided on Battery charger for connecting load (min. 12 numbers of outgoing) through DC Distribution Box (DCDB) and for connecting battery terminals. All terminals shall be of suitable size nickel plated steel. Suitable nickel plated copper lugs shall be provided by the supplier for the use of purchaser for connecting the load wiring. All connectors and leads shall be suitable for carrying discharge current for 30 min. continuously and through fault short circuit current which the battery can produce and withstand for the period declared.
5.3	Connectors	Nickel plated copper connectors shall be used for connecting the terminals of battery charger with the battery bank. Bolts, nuts and washers shall be nickel plated/ stainless steel. All terminals and interconnectors shall be fully insulated or shall have insulation shrouds.
5.4	Cooling and ventilation	Proper arrangement of natural air or forced air fan cooling (if required) to be provided for the Battery charger to restrict the temperature rise beyond 40°C
5.7	Stand and racks	Suitable corrosion resistant Battery charger racks and cable supports shall be provided. Metallic racks shall be properly earthed. The bottom tier of stand shall have a ground clearance of 150 mm (minimum), above the floor. Racks shall be made of alkali resistant powder coated steel or stainless steel to ensure corrosion resistance.
5.8	User interface with controller	Local Monitoring: Web browser via Ethernet or WLAN Through Serial Port WEB server Web UI with configurable access rights, login control and user profiles Remote monitoring: Web browser, MODBUS Protocol Communication, OEM specific protocols via Ethernet, RS485 Remote alarming: Dry contacts; dial-out together with modems / RTU
5.8	Painting	The racks shall be painted with anti-corrosive paint of 80 micron thickness (minimum) of shade RAL 7032.
5.9	Packing	Bidder shall ensure that all the equipment covered by this specification shall be prepared for rail/ road transport (local equipment) and be packed in such a manner as to protect it from any damage in transit.
6.0	NAME PLATE AND MARKINGS	The unit shall be provided with a name plate clearly visible and effectively secured against removal. The name plate shall be indelibly and distinctly marked with all essential particulars as per relevant standards along with the following: - Manufacturer's name - Month and Year of manufacture

		iii) Serial number and Type designation iv) Rated input voltage v) Rated input voltage vi) Maximum input current vii) Maximum output current viii) Guarantee period. ix) Reference standard x) Property of TPCODL/TPNODL/TPSODL/TPWODL Also, the danger plate should be shown on the front of the enclosure/ cabinet/ racks housing the battery bank.
7.0	TESTS	All routine, acceptance & type tests shall be carried out in accordance with the relevant standards mentioned in clause 2.0. All routine & acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the metering cubical in addition to others specified in IS/IEC/IEEE/UL standards.
7.1	Type Test	a) Measurement of Power loss/ consumption in rectifier auxiliaries b) Equipment reactance test c) Measurement of voltage regulation / AVR regulation d) Efficiency and power factor measurement test e) Temperature rise test so as to determine the temperature rise of Semiconductor, Ferrite cores and cabinet etc. f) Measurement of insulation resistance. i. AC input to earth ii. AC input to DC output iii. DC output to earth g) DC voltage current characteristic h) High Voltage Tests. i) Determination of regulation j) Measurement of ripple k) Reverse leakage test l) Test for confirmation of reduction in float voltage with increase of battery temperature and vice-versa
7.2	Routine tests	All the routine tests should be conducted as per the relevant standards mentioned in clause 2.0.
7.3	Acceptance Tests	a) Measurement of voltage regulation b) Efficiency and power factor measurement c) Temperature rise test so as to determine the temperature rise of Semiconductor capacitor, choke, Ferrite cores and cabinet etc. d) Measurement of insulation resistance. i. AC input to earth ii. AC input to DC output iii. DC output to earth e) DC voltage current characteristic f) High voltage tests. g) Determination of regulation. h) Measurement of ripple i) Tests for indications and alarms as per this specification j) Tests for indicating instruments. k) Determination of system set points. l) Soft start test
8.0	TYPE TEST CERTIFICATES	The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA or

		any third-party NABL accredited laboratory, as per the relevant standards mentioned in clause 2.0. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to the purchaser.
9.0	PRE-DISPATCH INSPECTION	The successful bidder shall submit one prototype samples for further testing and compliance as per specifications and getting approval before mass manufacturing. Equipment shall be subject to inspection by a duly authorized representative of the TPCODL/TPNODL/TPSODL/TPWODL. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to the TPCODL/TPNODL/TPSODL/TPWODL representatives at all times when the work is in progress. Inspection by the TPCODL/TPNODL/TPSODL/TPWODL or its authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by the Purchaser. Following documents shall be sent along with material : - Test reports - MDCC issued by Purchaser - Invoice in duplicate - Packing list - Drawings & catalogue - Guarantee / Warrantee card - Delivery Challan - Other Documents (as applicable)
10.0	INSPECTION AFTER RECEIPT AT STORE	The material received at Purchaser's store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Engineering department.
11.0	GUARANTEE	Bidder shall stand guarantee towards design, materials, workmanship & quality of process/manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Purchaser up to a period of 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract, whichever is earlier. Bidder shall be liable to undertake to replace/rectify such defects at his own costs, within mutually agreed timeframe, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at Bidder's risks and costs and recover all such expenses plus the Purchaser's own charges (@ 20% of expenses incurred), from the Bidder or from the "Security cum performance Deposit" as the case may be. In case the battery bank, battery charger or/ and the BMS fails within the guarantee period, the purchaser will immediately inform the bidder who shall take back the failed/ faulty part within 15 days from the date of intimation at his own cost and replace/repair it within forty-five days of date of intimation with a roll over guarantee. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser. Service Level Agreement:

		Services to be included during guarantee period: 1. Guarantee shall be for 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract, whichever is earlier. 2. In case of any failure vendor shall report to site, within 24 hours of receipt of reporting of failure occurrence. 3. Vendor shall provide replacement of faulty part/ equipment within 4 days, after the confirmation of the fact that the part/ equipment cannot be repaired at site. 4. Vendor shall provide detailed root cause analysis of the fault within 15 days from the date of occurrence of the fault/ failure. 5. Any spare part replacement, testing and its commissioning to be done by the vendor only, without any price implication to the purchaser. 6. Any equipment, software or hardware to test the Battery Charger with the back-up battery bank, to be borne by the vendor only. Service to be included during tender: 1. Vendor needs to provide life-cycle support and supplies to ensure necessary support in terms of services and spares for 15 years from the date of PO. 2. Vendor needs to provide AMC for 10 years after guarantee period.
12.0	PACKING	Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit. The material used for packing should be environment friendly.
13.0	TENDER SAMPLE	Not Applicable.
14.0	TRAINING	The successful bidder shall provide training to 5 teams of TPCODL/TPNODL/TPSODL/TPWODL at site, regarding the handling, operation and maintenance of the thyristor based Battery Charger.
15.0	QUALITY CONTROL	The bidder shall submit the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.
16.0	MINIMUM TESTING FACILITIES	Bidder shall have adequate in house testing facilities for carrying out all routine tests, acceptance tests as per Indian/International standards mentioned in clause 2.0.
17.0	MANUFACTURING ACTIVITIES	The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.
18.0	SPARES, ACCESSORIES AND TOOLS	A list of important spares to be recommend by manufacturer and to be supplied with the equipment. The quantities of spares shall be decided by the purchaser.
19.0	DRAWING AND DOCUMENTS	Following drawings and documents shall be prepared based on Purchaser specifications and statutory requirements and shall be submitted with the bid : a) Completely filled in General Technical Particulars b) General arrangement drawing for thyristor based battery charger (with SLD and detailed circuit diagram). c) Experience List

		d) Type test certificates e) 2 Copies of Instruction manual (O&M/Trouble shooting guide) shall be provided with each unit After the award of the contract, soft copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval. <table><tr><th>Sr. No.</th><th>Description</th><th>For Approval</th><th>For Review Information</th><th>Final Submission</th></tr><tr><td>1.</td><td>Technical Parameters</td><td>✓</td><td></td><td>✓</td></tr><tr><td>2.</td><td>GA Drawing</td><td>✓</td><td></td><td>✓</td></tr><tr><td>3.</td><td>Installation Instruction</td><td></td><td></td><td>✓</td></tr><tr><td>4.</td><td>Transport/ Shipping dimension drawing</td><td></td><td>✓</td><td>✓</td></tr><tr><td>5.</td><td>QA & QC Plan</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>6.</td><td>Test Certificates</td><td>✓</td><td>✓</td><td>✓</td></tr></table> All the documents & drawings shall be in English language. Instruction Manual (in English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices shall also be submitted by the BA.	Sr. No.	Description	For Approval	For Review Information	Final Submission	1.	Technical Parameters	✓		✓	2.	GA Drawing	✓		✓	3.	Installation Instruction			✓	4.	Transport/ Shipping dimension drawing		✓	✓	5.	QA & QC Plan	✓	✓	✓	6.	Test Certificates	✓	✓	✓
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20.0	GUARANTEED TECHNICAL PARTICULARS	Clause-wise compliance to this specification.																																			
21.0	SCHEDULE OF DEVIATION	(TO BE ENCLOSED WITH THE BID) All deviations from this specification shall be set out by the bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser’s specifications: <table><tr><th>S. No.</th><th>Clause No.</th><th>Details of deviation with justifications</th></tr><tr><td></td><td></td><td></td></tr></table> We confirm that there are no deviations apart from those detailed above. Seal of the Company Signature : Designation :	S. No.	Clause No.	Details of deviation with justifications																																
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