Kashmir Power Distribution Corporation Ltd.
Office of the Chief Engineer Planning & Procurement,
PDD Complex, Bemina, Srinagar.
Tel: 0194-2493280, 0194-2493281, Email: ceppkpdcl@gmail.com

TECHNICAL SPECIFICATION

OF

30 VOLT, 100 AH, FLOAT CUM BOOST BATTERY CHARGER

Prepared by	Checked by	Checked by	Checked by	Approved by
Er. Javid Ahmad Sidiqui (AEE Procurement) Er.Sheikh Abid (JE)	Er. Manzoor Ahmad Dar (Executive Engineer)	Er. Muzaffar Mukhtar Shah Superintending Engineer, Procurement Circle.	Er. Bashir Ahmad Dar Chief Engineer, Planning & Procurement Wing, KPDCL, Srinagar.	Techno Economic Committee vide No. MD/KPDCL/ TS-1/1920-26 Dated:12/08/2022

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This Tender Specification for procurement of Float cum Boost Battery Charger may be subjected to the modification by the purchaser as per actual field requirement. Supplier to submit the Guaranteed Technical Particulars (GTP) and Drawings, after the award of the Contract, for approval of the Purchaser.

CLIMATIC AND ISOCERAUNIC CONDITIONS (CIC)

1.	The climatic and Isoceraunic conditions at the site of work are approximately given as under:	
	Description	Kashmir
i)	Max. temp of air in shade	30.6^0C
ii)	Min. temp of air in shade	-20^0C
iii)	Max. temp of air in sun	45^0C
iv)	Height above sea level (App.)	1600 Mtrs.
v)	Max. relative humidity	90%
vi)	Min. relative humidity	15%
vii)	Average no. of thunder storm days per year	54
viii)	Average rainfall	80 cm
ix)	Wind Zone	WZ – 3
x)	Average number of rainy days per year	106
xi)	Seismic Zone	SZ – 5
xii)	Area of installation	Heavy Snow Zone

2. **Communication and Transport:**

The nearest railway station is Jammu on the broad gauge line and is connected to the Divisional Stores by a metal road. The equipment is required to pass en-route through various tunnels on NH-44 (Nandni, Nashri and Jawahar Tunnel). The weights and maximum dimension of the packages suitable for transportation through tunnel route are as follows:-

1. Length = 7.0 m
2. Width = 3.0 m
3. Height = 4.55 m
4. Weight = 40 metric Ton

The supplier shall get the permissible weight and dimensions confirmed from the Highway Authorities before proceeding with the manufacture of the equipment. It willbe the responsibility of the supplier to ensure timely and proper delivery of the equipment on door delivery basis, at Srinagar, through road transport. The supplier shall also ensure that the weights and dimension of the packages which are suitable to be carried by road transport up to Srinagar.

3.	**Additional conditions**	
i	Permitted Noise Level	45D b
ii	Induced Electromagnetic disturbance	1.6k V
iii	Pollution class/ creepage distance	III/ 25mm/kV
iv	Isoceraunic Level (days/year)	50
v	Condensation	Occasional

TECHNICAL SPECIFICATION FOR 30 V FLOAT CUM BOOST BATTERY CHARGER

1. SCOPE:

i) This specification covers supply, design, manufacture, assembly, testing at manufacturer's works, packing and delivery of 30 V,100AH float cum boast battery charger, compatible with 100 AH, 2Vx15No., Valve Regulated Lead Acid (VRLA) Battery Bank.

ii) It is not the intent to specify completely herein all details of the design and construction of equipment. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the Bidder's guarantee in a manner acceptable to the Purchaser, 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.

iii) The equipment offered 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 or not.

2. SERVICE CONDITIONS:

Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the tropical conditions mentioned above in climatic and isoceraunic conditions..

3. General Nature of Climate:

Moderately hot summers and cold winters with moderate to heavy snowfall and freezing temperatures. The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.

4. GENERAL REQUIREMENTS:

4.1 The DC system for 30 V DC is unearthed. The Battery Chargers as well as their Automatic regulators shall be of static type and shall be compatible with VRLA batteries. The battery chargers shall be capable of continuous operation at rated load in float / trickle charging mode, i.e.float charging the associated DC VRLA batteries at 2.15 to 2.25 volts ± 0.02 volts per cell while supplying the DC load. The chargers shall also be capable of boost charging the associated DC battery at 2.3 to 2.35 ± 0.02 volts per cell at the desired rate.

4.2 Charger shall regulate the float/boost voltage in case of prescribed temperature rise of battery as per manufacturer's recommendation to avoid thermal runaway. Necessary temperature sensors provided in mid location of battery banks shall be wired up to the respective charger for feedback control**.**

4.3 The battery chargers shall be provided with facility for both automatic and manual

control of output voltage and current. A selector switch shall be provided for selecting the mode of output voltage/current control, whether automatic or manual. When on automatic control mode during trickle/float charging, the charger output voltage shall remain within ± 1% of the set value, for AC input voltage variation of –15% to +10%, frequency variation of ± 5%, a combined voltage and frequency variation of ± 10%, and a DC load variation from zero to full load.

4.4 The battery chargers shall have constant voltage characteristics throughout the range (from zero to full load) at the floating value of the voltage so as to keep the battery fully charged but without harmful overcharge.

4.5 The battery chargers shall have load limiters having drooping characteristic which shall cause, when the voltage control is in automatic mode, a gradual lowering of the output voltage when the DC load current exceeds the load limiter setting of the charger. The load limiter characteristics shall be such that any sustained overload or short circuit in DC system shall not damage the charger, nor shall it cause blowing of any of the charger fuses. The charger shall not trip on overload or external short circuit. Soft start feature should be invariably provided to minimize the inrush current from the float charger to discharged battery.

4.6 Uniform and step less adjustments of voltage setting (in both manual and automatic modes) shall be provided on the front of the charger panel covering the entire trickle charging output range specified. Step less adjustments of the load limiter setting shall also be possible for 80% to 100% of the rated output current for charging mode.

4.7 During boost charging, the battery charger shall operate on constant c u r r e n t mode (when automatic regulator is in service). It shall be possible to adjust the boost charging current continuously over a range of 50% to 100% of the rated output current for boost charging mode.

4.8 The charger output voltage shall automatically go on rising, when it is operating on boost mode, as the battery charges up. For limiting the output voltage of the charger, a potentiometer shall be provided on the front of the panel, where by it shall be possible to set the upper limit of this voltage anywhere in the output range specified for boost charging mode. The charging system should also ensure the connection of the full battery to the load bus bar even if another AC power failure takes place, when the battery is in boost charge mode. The circuit should also provide a continuity of DC supply even during any 'Ride through' period.

4.9 The charger manufacture may offer an arrangement in which the voltage setting device for trickle/float charging mode is also used as output voltage limit setting device for boost charging mode, and the load limiter of trickle/float charging mode is also used as current setting device in boost charging mode.

4.10 Suitable filter circuits shall be provided in all the chargers to limit the ripple content (peak topeak) in the output voltage to 1% irrespective of the DC load, even when they are not connected to the battery.

5. Applicable Standards:

Unless otherwise specified, the equipment shall conform to the latest applicable Indian standards and in particular to the following standards:

1	IS: 3895	Specification for Rectifier equipment's in general
2	IS:13947 (Part II)	Specification for MCB
3	IS: 1248	Indication instruments
4	IS: 2147	Degree of protection for cubicles
5	IS: 375	Specification for wiring
6	IS: 4540	Mono crystalline semiconductor rectifiers assemblies & equipment
7	IS: 6619	Safety code for semiconductor rectifier equipment
8	IS: 2026	Transformers
9	IS: 4237	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts
10	IS: 4064	Air Break switches and fuse combination units
11	IS: 6005	Code of practice for phosphating of Iron & Steel
12	IS: 5	Colour for ready mix paints
13	IS: 5921	Printed circuit Board
14	IS: 249	Printed circuit Board
15	IS: 5578	Guide for making insulated conductor

The agency shall clearly state the standards to which the equipment offered by him conforms.

6. Contactors:

All battery chargers shall have an AC contactor on the input side. It shall be of air break type and suitable for continuous duty. The operating coil shall be rated for 240 volts AC.

7. Thermal Overload Relay:

A thermal overload relay incorporating a distinct single phasing protection

(using differential movement of bimetal strips) shall also be provided for the AC input. The relay shall trip the above contactor.

8. MCB:

All Battery Chargers shall have 1 No. MCB of suitable capacity on the input side to receive cables from source. MCB of suitable rating shall be provided on DC output side in all chargers.

9. Rectifier Transformer:

The rectifier transformer shall be copper wound, continuously rated, natural air cooled (AN) and of Class F insulation type. The rating of the rectifier transformer shall correspond to the rating of the associated rectifier assembly. The rectifier transformer shall have 10% overload capacity.

10. Rectifier Assembly:

Full wave controlled bridge circuits, preferably full wave half controlled, shall be provided for both float and boost charger. The rectifier assembly shall be designed to meet the duty as required by the respective charger. The rectifier shall be provided with heat sink having their own heat dissipation arrangements with natural air cooling. Necessary surge protection devices and semiconductor type fast acting HRC fuses shall be provided in each arm of the rectifier connections.

11. Instruments:

One AC voltmeter and one AC ammeter along with selector switches shall be provided for each charger. One DC voltmeter and one DC ammeter (with shunt) shall be also be provided for each charger. The instruments shall be flush type, dust proof and moisture resistant. The instruments shall have easily accessible means for zero adjustment. The instruments shall be of 1.5 accuracy class. Indicating lamps shall be provided across the AC and DC supply. In addition to the above a centre zero voltmeter with selector switch shall also be provided with chargers for testing purpose.

12. Air Break Switches:

AC input and DC output switches shall be provided in all chargers. They shall be air break type suitable for 240 V/50 Hz AC and 30 V DC. The contacts of the switches shall open and close with a snap action. The operating handle of the switch shall be fully insulated from circuit. ON and OFF position of the switch shall be clearly indicated. Rating of switches shall be suitable for their continuous load. Switches shall be fully protected by associated high rupturing capacity fuses during abnormal operating conditions such as short circuit etc.

13. Fuses:

All fuses shall be HRC link type. Fuses shall be mounted on fuse carriers which are 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 cases one insulated fuse pulling handle shall be supplied for each charger. Fuse rating shall be chosen by the supplier depending on circuit requirement and these shall be subjected to the approval of the Purchaser. All fuses in the chargers shall be monitored. Fuse failure annunciation shall be provided on the failure of any

fuse.

14. Blocking Diode:

Blocking diode shall be provided in the positive pole of the output circuit of each charger to prevent current flow from the DC battery into the charger.

15. Annunciation System:

Audio-Visual indications through bright LEDs or annunciation fascia shall be provided in all chargers for the following abnormalities:

a) AC power supply failure
b) Rectifier/charger fuse / MCB blown
c) DC fuse / MCB failure
d) Over voltage across the battery when boost charging
e) Filter fuse failure
f) Load limiter operated
g) Abnormal voltage (High/low)
h) Battery earth leakage
i) Any other annunciation if required

Potential free NO contacts for above abnormal conditions shall also be provided for a common remote indication "CHARGER TROUBLE" in Purchaser's control board. Indication for charger in float mode and boost mode through indication lamps shall be provided for chargers. A potential free contact for float/boost mode shall be provided for external interlocks.

16. Name Plates and Marking:

The name plates shall be white with black engraved letters. On top of each charger, on front as well as rear sides, larger and bold name plates shall be provided to identify the charger. Name plates with full and clear inscription shall also be provided on and inside of the panels for identification of the various equipment and ease of operation and maintenance.

17. Charger Construction:

a) The chargers shall be indoor, floor mounted, self-supporting sheet metal enclosed cubicle type. The Contractor shall supply all necessary base frames, anchor bolts and hardware. The chargers shall be fabricated from 2.0 mm cold rolled sheet steel and shall have folded type of construction. Removable gland plates for all cables and lugs for power cables shall supplied by the Contractor. The lugs for power cables shall be made of electrolytic copper with tin coat. The provision of lugs and drilling of gland plates shall suit the required power cable. The charger shall be tropicalized and vermin proof. Ventilation louvers, if provided shall be backed with screens. All doors and covers shall be fitted with synthetic rubber gaskets. The chargers shall have hinged leaf doors provided on front and on backside for adequate access to the charger's internals. All the charger cubicle doors shall be properly earthed. The degree of protection of charger enclosure shall be at least IP- 42 as per IS: 2147.

b) All indicating instruments, control switches and indicating lamps shall be

mounted on the front side of the charger.

c) Each charger shall be furnished completely wired up to power cable lugs and terminal blocks ready for external connections. The control wiring shall be carried out with 1.1 kV, FRLS, PVC insulated, 2.5 sq.mm. stranded copper wires. Control terminals 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. Each wire shall bear a ferrule or tag on each end for identification. At least 20% spare terminals shall be provided for control circuits.

d) The insulation of all circuits except the low voltage electronic circuits shall withstand test voltage of 2 kV AC for one minute. An Air clearance of at least ten (10) mm shall be maintained throughout for such circuits, right up to the terminal lugs. Whenever this clearance is not available, the live parts shall be insulated or shrouded.

18. Painting:

All sheet steel work shall be pre-treated, in tanks, in accordance with IS:6005. Degreasing shall be done by alkaline cleaning. Rust and scale shall be removed by pickling with acid. After pickling, the parts shall be washed in running water. Then these shall be rinsed in slightly alkaline hot water and dried. The phosphate coating shall be class C, as specified in IS:6005. Welding shall not be done after phosphating. The phosphated surfaces shall be rinsed and passivated prior to application of stoved red(lead) oxide primer coating. After primer application, two coats of finishing synthetic enamel paint of shade 692 (smoke grey) of IS:5 shall be applied, unless required otherwise by the owner. The inside of the chargers shall be glossy white. Each coat of finishing synthetic enamel paint shall be properly stoved. The paint thickness shall not be less than fifty (50) microns.

19. The supplier shall have to ascertain that the charger conforms to the specification, particularly regarding continuous rating, ripple content, voltage regulation and load limiting characteristics, before dispatch as well as after installation at site.

20. Tests:

Battery Chargers shall conform to all type tests as per relevant Indian Standard. Performance test on the Chargers shall also be carried out on each charger as per specification. Rectifier transformer shall conform to all type tests in IS: 4540 and short circuit test as per IS: 2026.

Following type tests shall be carried out for compliance of specification requirements:

(i) Voltage regulation test.
(ii) Load limiter characteristics test
(iii) Efficiency tests
(iv) High voltage tests
(v) Temperature rise test
(vi) Short circuit test at no load and full load at rated voltage for sustained short-circuit.
(vii) Degree of protection test
viii) Measurement of ripple by oscilloscope.

ix) Temperature compensation feature demonstration

The supplier may be required to ascertain to the purchaser that the chargers conform to the specification particularly regarding continuous rating, ripple free output, voltage regulation and load limiting characteristic, before dispatch as well as after installation at site. At site the following tests shall be carried out:

(i) Insulation resistance test
(ii) Checking of proper annunciation system operation

If the Charger fails to meet the specified requirements, the supplier shall replace the same with appropriate Charger without affecting the commissioning schedule of the Sub-Station, and without any extra cost to the purchaser.

21. The supplier shall present for inspection, the type and routine test certificates for the followingcomponents whenever required by the Purchaser.

a. Switches
b. Relays/MCCBs
c. Instruments
d. DC fuses
e. SCR
f. Diodes
g. Condensers
h. Potentiometers
i. Semiconductor
j. Annunciator
k. Control wiring
l. Push buttons and contactors

22. WARRANTY CLAUSE:

The warranty shall remain valid for a period of eighteen (18) months from the date of delivery or twelve (12) months from the date of commissioning of Goods at Purchaser's destination. The Supplier warrants that all the Goods supplied under the Contract shall comply strictly with the Contract, shall be first class in every particular and shall be free from defects. The Supplier further warrants that all equipment, materials and supplies furnished by the Supplier for the purpose of the Goods are new, production of the most suitable grade and fit for their intended purposes.

23. CHALLENGE CLAUSE:

The Purchaser reserves the right to have the material, received after inspection by the authorized inspecting officer, again tested for any parameter(s) from approved/NABL accredited testing house/in house technique of the purchaser. The results if found deviating/unacceptable or in non-compliance with the approved GTP'S, the lot shall be rejected and bidder shall arrange to replace the rejected lot within thirty (30) days of such detection at his cost including to & fro transportation.