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CORRIGENDUM-II

BID IDENTIFICATION NO: *AEGCL/MD/TECH-1009/Deposit/NFCON/Sonabil/2022/*BID

Turnkey Construction of 132kV N.F. Railway Traction Bay and a Bus Coupler Bay at 132kV Sonabil GSS, AEGCL including Supply of Bay Equipment and line bay materials and associated works etc.

Following additional Section is added in the BID -VOLUME-II Technical Specifications

Section-12: Technical specification of Battery Bank and Charger

12.1.0. SCOPE

12.1.1. This Section of the Specification covers the design, manufacture, and testing at manufacturer's work, of stationary type sealed, Valve Regulated Lead Acid Battery Bank, Dual FCBC Battery Charger, DC Distribution Boards and LTAC Panels complete with all required accessories for various Sub-stations.

12.2.0. BATTERY BANK

12.2.1. TYPE AND RATING

A. For Substation with highest voltage of 145 kV (if not specifically mentioned in the Schedule of Quantities)

For 220 KV, 132 KV & 66 KV sub-stations, DC System shall consist of One (1) float cum-boost charger and one (1) battery set for 220V system. DC scheme shall consists of one (1) battery

i) Stationary type, sealed, valve regulated lead acid battery tank suitable for operation on 110 Volts D.C. system to meet loads like emergency lightning, control and signaling circuits, relays, breaker operations, indicating circuits, etc. shall be required. The stationary battery shall comply with the provisions of IEC 60896.

ii) The Ampere-hour capacity of the battery bank at 27°C at 10 hours discharge rate shall be 300 AH.

iii) The nominal voltage of the battery bank shall be 110 Volts D.C.

iv) The number of cells in a complete battery bank set shall be 55 plus 2 spares.

B. For Substation with highest voltage of 245 kV (if not specifically mentioned in the Schedule of Quantities)

(i). Stationary type, sealed, valve regulated lead acid battery tank suitable for operation on 220 Volts D.C. system to meet loads like emergency lightning, control and signaling circuits, relays, breaker operations, indicating circuits, etc. shall be required. The stationary battery shall comply with the provisions of IEC 60896.

(ii). The Ampere-hour capacity of the battery bank at 27°C at 10 hours discharge rate shall be 300 AH.

(iii). The nominal voltage of the battery bank shall be 220 Volts D.C.

(iv). The number of cells in a complete battery bank set shall be 110 plus 2 spares.

12.2.2. PLATES

Positive plates shall be made of flat pasted type using lead-cadmium antimony alloy for durability, high corrosion resistant, maintenance free, long life both in cyclic as well as in, float applications. Negative plates shall be heavy duty, durable flat plate using lead calcium alloy pasted box grid. Negative plates shall be designed to match the life of positive plates and combination of negative and positive plates shall

ensure long life, durability and trouble-free operation of battery. PLC operated equipment should be deployed for preparation of paste to ensure
consistency in paste quality. Conventional / manual type of paste preparation is not allowed.

12.2.3. CONTAINER AND LID

The containers and lids shall be made of a special grade polypropylene copolymer plastic material. They shall be sufficiently robust and not liable lo deformation under internal operating pressures and within the temperature range naturally encountered, leak proof, non-absorbent and resistant to the acid with low water vapour permeability.

12.2.4. VENT PLUGS

Each cell shall be equipped with one-way safety valve with opening pressure of 5±1 psi and closing pressure 4±1 psi. The vent plug shall be made with suitable grade of fire retardant plastic material. Each valve opening shall be covered with flame barrier capable in preventing the ingress of flame into the cell interior when the valve opens and hydrogen / oxygen gas mixture is released.

12.2.5. SEPARATORS

Separator shall be made of spun glass, micro porous matrix and shall be resistant to Sulphuric Acid. It shall be capable of keeping the entire electrolyte and shall be electrically insulated. Sufficient separator overlap and PVC shield protection to top and bottom edges of the plates is to be provided to prevent short circuit formation between the edges of adjacent plates.

12.2.6. CONNECTORS

The connectors shall be lead coated copper of suitable size to join the cells. The connectors shall be suitably designed and coated to withstand corrosion due to sulphuric acid. The coating should be adequate and tenacious. All the copper inter cell connectors shall be provided with heal shrinkable sleeves except at the connecting points.

12.2.7. ELECTROLYTE:

The electrolyte shall be prepared from the battery grade Sulphuric Acid confirming to ISS: 266. The batteries shall be supplied in factory filled and charged condition.

12.2.8. WATER

Water required for preparation of electrolyte shall conform to IS: I069.

12.2.9. PLATE CONNECTION

Lugs of plates of like polarity shall be connected by lead burning to a horizontal strap having an upstanding terminal post adopted for connection to external circuit. Strap and post shall be caste with lead alloy. The positive and negative terminal posts shall be clearly marked for unmistakable identification.

12.2.10. BOLTS AND NUTS

Nuts and Bolts for connecting the cells shall be of superior grade passivated Stainless steel.

12.2.11. TERMINALS

Terminals shall be of integral lead terminal with solid copper core with M6 threading for fastening. The junction between terminal posts and cover and between the cover and container shall be hermetically sealed.

12.2.12. BATTERY RACKS

Batteries shall be installed on MS racks to be supplied by the Contractor to fit in the battery room. Racks/Trays shall be powder coated with anti-corrosive paint. Rack shall accommodate 55/110 cells plus 2 spares. Racks/Tray shall be suitably treated before painting for protection against fungus growth and other harmful effects due to tropical environment.

The colour of the supporting racks shall conform to shade 631 of IS: 5.

12.3.0. BATTERY CHARGING EQUIPMENTS

12.3.1. GENERAL DESCRIPTION

The battery charging equipment shall have two separate Boost-cum Trickle Charger sections. Each section shall have its own rectifier transformer, rectifier bridge and
other equipment so that each section can operate independent of each other. The charger-I shall normally be in float mode and will supply load while Charger-II remains as hot standby. In case charger in boost mode, the Charger-II shall supply the normal load.

Each section of the battery chargers shall be capable of continuous operation at itsrated load in float charging mode, i.e. Float charging the associated Batteries at 2.13 to 2.27 Volts per cell while supplying the DC load. The chargers shall also be capable of Boost charging the associated DC Battery at 2.28 to 2.32 volts per cell at the desired rate.

Each charger section 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 shall be provided in mid location of battery banks and shall be wired up to the respective charger for feedback control. The manufacturer shall demonstrate this feature during testing of each charger.

12.3.2. OPERATION AND CONTROL

During normal operation of the one of the charger sections shall supply the normal direct current requirements of the substation and the station battery shall be floating on the other charger section. In the event of failure of A.C. supply or failure of the both sections of the charger itself the battery shall come automatically across the load without any interruption. Similarly in case of failure of any one section of the charger the DC load or the battery as the case may be, shall come automatically change over to the healthy charger section without any interruption.

All 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 Float charging, the Charger output voltage shall remain within +1% of the set value, for AC input voltage variation of +10%, frequency variation of +5%, a combined voltage and frequency variation of +10%, and a DC load variation from zero to full load. All battery chargers shall have a constant voltage characteristic 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.

All 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. 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 float charging output range specified. Step less adjustments of the Load limiter setting shall also be possible from 80% to 100% of the rated output current for charging mode. During Boost Charging, the Battery Charger shall operate on constant current 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 currentfor Boost charging mode. 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, whereby it shall be possible to set the upper limit of this voltage anywhere in the output range specified for Boost Charging mode. The Charger manufacturer may offer an arrangement in which the voltage setting device for Float charging mode is also used as output voltage limit setting device for Boost charging mode and the Load-limiter of Float charging mode is used as current setting device in boost charging mode. Suitable filter circuits shall be provided in all the chargers to limit the ripple content (Peak to Peak) in the output voltage to 1%, irrespective of the DC load level, when they are not connected to a Battery.

12.3.3. MCCB

All Battery Chargers shall have 2 Nos. MCCBs on the input side to receive cables for two charger sections. It shall be of P2 duty and suitable for continuous duty. MCCB's should have auxiliary contacts for annunciation. Rectifier TransformerThe rectifier transformer shall be continuously rated, dry air cooled (A.N) and of class F insulation type. The rating of the rectifier transformer shall have 10% overload capacity.

12.3.5. Rectifier Assembly

The rectifier assembly shall be fully/half controlled bridge type and 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 rectifier type fast acting HRC fuses shall be provided in each arm of the rectifier connections.

12.3.6. Instruments

One AC voltmeter and one AC ammeter along with selector switches shall be provided for each charger sections. One DC voltmeter and DC ammeter (with shunt) shall be provided for all Charger sections. 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. In addition to the above a centre zero voltmeter with selector switch shall also be provided for each charger sections for testing purpose.

12.3.7. Air Break Switches

One DC output switch shall be provided in each charger sections. They shall be air break type suitable for 500 volts AC/ 250 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 on the switch shall be clearly indicated. Rating of switches shall be suitable for their continuous load. Alternatively, MCCB's of suitable ratings shall also acceptable in place of Air Break Switch.

12.3.8. 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.

12.3.9. 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.

12.3.10. Annunciation System

Audio-visual indications through bright LEDs shall be provided in each Charger sections for the following abnormalities:

a) AC power failure
b) Rectifier/chargers fuse blown.
c) Over voltage across the battery when boost charging.
d) Abnormal voltage (High/Low)
e) Any other annunciation if required.

Potential free NO Contacts of above abnormal conditions shall also be provided for common remote indication "CHARGER TROUBLE" in Employer's Control System. 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.

12.3.11. Charger Construction

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 2.0mm cold rolled sheet steel and shall have folded type of construction. Removable gland plates for all cables and lugs for power cables shall be supplied by the Contractor. The lugs for power cables shall be made of electrolytic copper with tin coat. Power cable sizes shall be advised to the Contractor at a later date for provision of suitable lugs and drilling of gland plates. The Charger shall be tropicalised 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 double 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: 13947 Part I. All indicating instruments, control switches and indicating lamps shall be mounted on the front side of the Charger. Each Charger shall be furnished completely wired upto power cable lugs and terminal blocks and ready for external connections. The control wiring shall be carried out with PVC insulated, 1.5 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. 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.

12.3.12. 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 phosphating surfaces shall be rinsed and passivated prior to application of stoved 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 Employer. The inside of the chargers shall be glossywhite. Each coat of finishing synthetic enamel paint shall be properly staved. The paint thickness shall not be less than fifty (50) microns.

12.3.13. CHARGER RATING

Each charger section shall have the following ratings:

A) For 220 Volt DC System

(i). Input Voltage : 415+/- 10% volts three phase, 4 wire, 50 Hz A.C.

(ii). Output Voltage : 220 Volt (Nominal).

(iii). Output DC Current : 45 A

B) For 110 Volt DC System

(i). Input Voltage : 415+/- 10% volts three phase, 4 wire, 50 Hz A.C.

(ii). Output Voltage : 110 Volt (Nominal).

(iii). Output DC Current : 45 A

12.3.14. TESTS AND INSPECTION

The battery charger and all the components of the charger shall be routine tested accordingly to their relevant standard. This shall include the following:

(a) Operational check for boost cum float charger.

(b) Input / Output test of the chargers.

(c) Performance test of the charger.

(d) Temperature rise test of the rectifier transformer.

(e) Power frequency H.V. test / Insulation tests.

The Contractor shall be required to demonstrate to the employer that the Chargers conform to the specification particularly regarding continuous rating, ripple free output, voltage regulation and load limiting characteristic, before despatch 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.

The Contractor shall present for inspection, the type and routine test certificates for the following components whenever required by the

Employer

(i) Switches.

(ii) Relays/MCCBs

(iii) Instruments.

(iv) DC fuses.

(v) SCR.

(vi) Diodes.

(vii) Condensers.

(viii) Potentiometers.

(ix) Semiconductor

(x) Annunciator.

(xi) Control wiring

(xii) Push button sand contactors

Makes of above equipment shall be subject to Employer's approval.

12.4.0. DC DISTRIBUTION BOARD

12.4.1. General Features ...

The D.C. distribution boards shall be indoor, floor mounting of self-supporting, sheet metal clad, and cubicle type. The panels should be totally enclosed, dust tight and vermin proof and shall be made of 2.0 mm cold rolled sheet steel. The boards shall be provided with double leaf hinged doors at the back. All doors and covers shall be fitted with rubber gaskets. The doors shall be provided with locks and duplicated covers

12.4.2. Bus bars

The bus bars shall be of electrolytic copper of ample cross-section. The bus bars shall be insulated from the structure by means of durable, non-hydroscopic, noncombustible and non-tracking materials.

12.4.3. Detail Requirements

The 110/220 Volts D.C. distribution boards shall be provided with the following:

i. One mains failure alarm relay.

ii. One earth fault alarm relay.

iii. One 110/220 Volts D.C. bell to be operated by the mains failure alarm relay.

iv. One 110/220 Volts D.C. buzzer to be operated by the earth failure alarm relay.

v. One double pole air-break circuit breaker of 400 amp capacity with thermal overload tripping arrangement to act as incoming breaker of the load bus.

vi. One 0-150/300 volts D.C. moving coil voltmeter to measure the bus-bar voltage. The display is to be in digital.

vii. One pilot lamp to indicate D.C. on conditions.

viii. 250 volts, double pole MCBs of following ratings for outgoing feeders.

a. 16 Amp, 6 Nos.(8 Nos. for 220 V system)

b. 32 Amp, 6 Nos. (8 Nos. for 220 V system).

c. 63 Amp, 2 Nos

ix. One terminal Board/block for all feeder outlets including cable glands.

12.5.0. LTAC PANEL

12.5.1. General Arrangement

The 415 volts L.T.A.C. panels shall be indoor floor mountings sheet metal clad type comprising of MCCBs and MCBs and bulbar chambers and equipped with circuits and equipment as specified. The different circuits shall be mounted above and below the bus bar chamber to form a suitable arrangement, except that the incomings will be located at the front and mounted below the bus bar chamber. All equipment shall be suitable for the reception of the cables rising from the ground level. The switchboards shall be so designed as to be readily extensible.

12.5.2. Bus bars

The phase and neutral bus bars shall be of high conductivity Aluminium of adequate uniform cross section. The bus bars shall be insulated from the structure by means of durable non-hygroscopic, non-combustible and non-tracking materials. Bulbar joints shall be of bolted type.

12.5.3. Detail Requirements

The 415 Volts, L.T.A.C. Switchgears shall have two Bus Sections with following circuits and equipment:

a) INCOMING: Two numbers each fitted with following (for each Bus Section):

i. 630 Amp, Electrically operated, TPN MCCB and cable glands suitable for 4-core P.V.C. cable labelled as 'INCOMING'.

ii. One Voltmeter with VSS.

iii. One Ammeter with ASS.

iv. One K.W.H. meter with connected C.T.

b) BUS COUPLER: One number fitted with following:

i. 630 Amp, TPN MCCB and cable glands suitable for 4-core P.V.C. cable labelled as 'INCOMING'.

ii. One Ammeter with ASS.

c) OUTGOINGS: Each Bus Section shall have following numbers of MCCBs for outgoing feeders:

i. One number 200 Amps T.P.N. MCCB.

ii. Two number 100 Amps TPN MCCB.

iii. Two numbers 63 Amps TPN MCCB.

iv. Two numbers 32 Amps TPN MCCB.

v. Three numbers 32 Amps SPN MCB.

12.5.4. Automatic AC Source Changeover

Automatic changeover between Incomer I and Incomer II is to be carried out during the failure of supply in any one of the incomers. After the restoration of the supply, system shall be restored to normal condition automatically. The requirement of changeover under various conditions are as below:

a) Under normal conditions i.e. when supply is available in both the incomers, incomers I & II of 415 V LTAC Panel shall be in closed condition and Bus Couplers breaker shall be in open condition.

b) In case of failure of either of the sources, the incomer of that source shall trip and Bus Coupler shall get closed. On restoration of supply, normal conditions described above are to be established automatically.

To avoid unnecessary operation of switchgear for momentary disturbances all changeovers from one state to another shall be initiated after a time delay, after the conditions warranting such change has been detected.

Any devices required to achieve the requirements above shall deem to be included in the scope of works.

All other terms and condition shall remain same.

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Interested parties may visit www.aegcl.co.in and https://assamtenders.gov.in for detail IFB and bid document.

Sd/-
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Memo No ***AEGCL/MD/TECH-1009/Deposit/NFCON/Sonabil/2022/10*** Dtd : 23.05.2022
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2. Ref. file.

Sd/-
Chief General Manager (PP&D)
Assam Electricity Grid Corporation Ltd