



**GUJARAT ENERGY TRANSMISSION CORPORATION LTD.**  
**SARADAR PATEL VIDYUT BHAVAN,**  
**RACE COURSE, BARODA – 390 007.**

**TECHNICAL SPECIFICATIONS**

**FOR**

**50V, 250Ah VALVE REGULATED MAINTENANCE**  
**FREE LEAD ACID BATTERY SETS**

GETCO/E/TS-BATT 03102/R0 Jan 2021

## **SPECIAL INSTRUCTIONS TO BIDDER**

Please read following instructions carefully before submitting your bid.

1. All the drawings, i.e. elevation, side view, plan, cross sectional view etc., in AutoCAD format and manuals in PDF format, for offered item shall be submitted. Also the hard copies as per specification shall be submitted.
2. The bidder shall submit Quality Assurance Plan for manufacturing process and Field Quality Plan with the technical bid.
3. The bidder shall have to submit all the required type test reports for the offered item.
4. The bidder must fill up all the point of GTP for offered item/s. Instead of indicating “refer drawing, or as per IS/IEC”, the exact value/s must be filled in.
5. All the points other than GTP, which are asked to confirm in technical specifications must be submitted separately with the bid.
6. The bidder is required to impart training in view of manufacture, assembly, erection, operation and maintenance for offered item, at his works, to the person/s identified by GETCO, in the event of an order, free of cost. The cost of logistics will be bear by GETCO.
7. Please note that the evaluation will be carried out on the strength of content of bid only. No further correspondence will be made.
8. The bidder shall bring out all the technical deviation/s only at the specified annexure.
9. The bidder should indicate manufacturing capacity by submitting latest updated certificate of a Chartered Engineer (CE).

**QUALIFYING REQUIREMENT DATA**

(For Supply)

Bidder to satisfy all the following requirements.

- 1) The bidder shall be Original Equipment Manufacturer (OEM). The offered equipment has to be designed, manufactured and tested as per relevant IS/IEC with latest amendments.
- 2) The minimum requirement of manufacturing capacity of offered type, size and rating of equipment shall be **7 times tender/bid quantity**. The bidder should indicate manufacturing capacity by submitting latest updated certificate of Chartered Engineer (CE).
- 3) Equipment proposed shall be of similar or higher rating and in service for a minimum period of THREE (3) years and satisfactory performance certificate in respect of this is to be available and submitted.
- 4) The bidder should clearly indicate the quantity and Single Value Contract executed during last FIVE (5) years, for the offered equipment. Bidder should have executed one single contract during last five years for the quantity equivalent to tender/bid.
- 5) The details are to be submitted in following format,

Sr. No	ITEMS SUPPLIED TO	ORDER REFERENCE No. & DATE	ITEMS	QUANTITY	ORDER FULLY EXECUTED YES/NO	STATUS, IF ORDER UNDER EXECUTION	REMARK
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- 6) Equipment offered shall have Type Test Certificates from accredited laboratory (accredited based on ISO/IEC Guide 25 / 17025 or EN 45001 by the National accreditation body of the country where laboratory is located), as per IEC / IS / technical specifications not older than SEVEN (7) years and valid till validity of offer.

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## **Technical Specification of 50V,250AH VRLA Maintenance free Battery Sets**

### **1.0 SCOPE:**

1.1 This specification covers the design, manufacture, Supply & testing of 50V, 250 Ah, HDP/ Hard Rubber Container lead acid tubular battery set (with tubular positive plates) VRLA Maintenance free high performance battery sets at the manufacturer's works and supply at site including FRP stand and all accessories mentioned in this specification.

### **2.0 APPLICABLE STANDARDS:**

2.1 Unless otherwise specified in this specification, the lead acid batteries shall comply with the following standards and latest amendments thereof.

- a) IEC 60896-2-1995 & IEE 1188: General requirements & methods of tests for stationary lead acid batteries.
- b) IS: 1885: Electrical vocabulary – Stationary cells and batteries.
- c) IS: 1651: Specification for stationery cells and batteries lead acid type (with tubular + ve plates)
- d) IS: 1146: Specification for hard rubber and plastic containers for lead acid storage batteries.
- e) IS: 6071: Specification for synthetic separators for lead acid batteries
- f) IS: 652: Specification for wooden separators for lead acid batteries.
- g) IS: 266: Specification for sulphuric acid
- h) IS: 1069: Specification for water for storage batteries
- i) IS: 3116: Specification for sealing compound for lead acid batteries.

### 3.0 General Requirements:

The VRLA battery offered shall not require topping up of cell with water. The basic reactions of the VRLA Battery remain the same as that of the conventional battery. However, the introduction of the Gas recombination principle by using Absorbent Glass Mate (AGM) has ensured that the gases evolved due to the electrolysis of water during charging are recombine in the cell, thus eliminating the need for topping up with water and thereby making the battery maintenance free.

- 3.1 The batteries shall be suitable for a long life under continuous float operations at 2.29 volts to 2.31 volts per cell and occasional discharges and shall be stationary lead acid type with **high discharge performance (HDP)** confirming to IS:1651 (latest edition) suitable for Indoor operation.
- 3.2 The batteries shall be of the capacity 50 Volts,250 Ah as per requirement of tender.
- 3.3 Battery of 50V, 250Ah rating shall consist of double tire, double row of 24 nos. of series connected HDP lead acid cells of 1.75 V/Cell at 27 Deg. C, having 250 ampere Hour Capacity at 10 hours Discharge Rate.
- 3.4 Fully discharged batteries shall get recharged at 25Amps rate within 10 hours at room temperature. The trickle charge rate shall be 50-100mA.
- 3.5 The battery offered shall be provided with Valves in order to isolate the cell interior from the external atmosphere. The Valves shall be closed during charging and open only during abnormal conditions to prevent excessive buildup of the pressure within the cell. Thus preventing any chance of explosion. The Valve shall be special designed to be fired and acid resistance and reseals when the internal pressure reaches the set value. The Valve shall be equipped with flame arresters in order to prevent the cells from internal explosion caused due to external sparks or open flame. The flame arrester shall also prevent the possibility of venting acids spray.
- 3.6 The battery shall design to provide long float life of around 20 years by use of heavy duty, non-corrosive grids made of lead calcium high tin alloy. The alloy shall have excellent corrosion resistance and low

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gassing properties. As the designed mode of failure for VRLA is grid corrosion, this property of alloy is very important for higher battery life.

- 3.7 The VRLA Battery shall also have a provision for grid growth. The provision for grid growth prevents plate short and container ruptures when the battery ages. Thus it enhances battery life by preventing failure of battery due to grid growth.
- 3.8 The Battery shall be manufactured using lead calcium high tin alloy, which has higher mechanical properties i.e. the plate grid does not deform during cycling which makes battery ideally suited for cycling and deep discharge applications and provides long cyclic life.
- 3.9 The cell containers and leads shall be made of impact resistance polypropylene and thermally welded to form a leak proof joint.
- 3.10 The single battery cell shall be assembled in steel enclosures /modules. These steel modules shall be rugged in construction to make the battery resistant to damages during transportation and used.
- 3.11 The battery shall be made using high grade and pure raw materials to reduce the rate of self-discharged. The self-discharge of the battery shall be as low as 0.5% per week at an average temperature of 27 deg C.
- 3.12 The battery should not emit corrosive fumes during charging which eliminate the requirement of special battery room. The modules shall be stacked which reduce substantially the floor space required.
- 3.13 The Module shall be power coated which gives excellent Aesthetic look to the battery.
- 3.14 The VRLA Battery shall operate at a wide range of temperature. To reduce the effect of temperature on the battery it shall be housed in a specially design ventilated modules to provide airflow grooves between the cells for dissipation of heat from the cells.
- 3.15 The battery shall have Flat Pasted positive plate having high mechanical strength & porosity. The construction of positive plate shall be such that active material is not displaced and allows free access of electrolyte for instant and unimpeded chemical reaction. It will

withstand high stress of contraction and expansion of the active material during charge and discharge.

- 3.16 The antimony lead selenium alloy content shall be restricted to minimum value and shall be less than 2% in + ve plate. There will be minimum voltage drop across the battery terminals.
- 3.17 The negative plates shall also be Flat pasted type matching with positive plates. The design of the plates shall be such that it is firmly placed in the cell.

<b>Sr. No.</b>	<b>Description</b>	<b>Type / Material</b>
1.	Positive Plates	Flat Pasted/Lead Dioxide (PbO <sub>2</sub> ) (Pb + Ca + Sn)
2.	Negative Plates	Flat Pasted / Spongy Lead (Pb) (Pb + Ca)

- 3.18 The separators shall be of Absorbent glass material having high acid absorption capability, resistant to sulphuric acid and good insulating properties. These separators shall be designed to permit oxygen evolve from the positive plate to the negative plate, thereby permitting electro chemical Recombination of oxygen and hydrogen to form water at a high degree of efficiency.

<b>Sr. No.</b>	<b>Description</b>	<b>Type / Material</b>
1.	Separators	Absorbent glass material (High Acid absorption capability, resistance to sulphuric acid and good insulating properties. / Fiber glass.

- 3.19 The cell container shall be closed type made of material as given in below table. The containers shall be well designed to take care of heat generated due to chemical reaction, stresses of expansion and contraction as well as changes in temperature.

<b>Sr. No.</b>	<b>Description</b>	<b>Type / Material</b>
1.	Containers & Cover.	Poly propylene moulded (Acid resistance) / Fire retardant (Poly Propylene UL 94 V0 with minimum limiting oxygen index of 28%.

- 3.20 The terminals of the cells shall be of generous cross section suitable for bolted connection. The inter cell/Inter row connectors shall be lead plated copper strips (Heat shrinkable sleeve) suitably over rated for taking care of high current duties of charge discharge cycle. All nuts and bolts shall be Stainless steel for cell-to-cell connections without lead coating.

Sr. No.	Description	Material
1.	Inter cell connector/ Inter row connector	Lead plated copper strips (with heat shrinkable sleeve) rated at 2 Amp / Sq.mm at 6 Hrs. discharge rate.
2.	Terminal post material	Lead plated brass insert, 2 Amp / Sq.mm at 6 Hrs. discharge rate.
3.	Nuts & Bolts	Stainless steel for cell to cell connections without lead coating.

- 3.21 The Safety valves shall be pressure regulated, self resealable and flame retardant and shall operate at internal cell pressure of 3 – 5 PSI. It shall be made of following material.

Sr. No.	Description	Material
1.	Housing	Poly propylene flame retardant (PPFR)
2.	Valve	Ethylene propylene dyne monomer rubber (EPDM rubber)

- 3.22 The cell container shall be closed type made **from non-porous Hard Rubber**. The material shall have chemical & electrochemical compatibility and shall be acid & heat resistant. The container and cover shall be capable of withstanding the rigorous of transport, storage and handling and shall be free from flaws. Sufficient space for sediments shall be provided.



### 3.23 Accessories:

The bidder shall supply the battery with accessories and devices as stated here under:

- I. One battery stand constructed out of FRP as per detailed specifications mentioned at cl.no. 3.24.
- II. One set of inter-cell, inter raw, inter-tier, inter rack, end take off connectors and lugs for termination of cables as required for the complete installation.
- III. One set of stand insulators and cell insulators of hard rubber material size.
- IV. Hydrometer syringe capable of indicating specific gravity reading in steps of 0.005. The hydrometer shall be complete with wall mounting teak wood holder.
- V. One DC voltmeter having range  $-3V - 0 - +3V$ , confirming to IS: 1248 (latest edition) with suitable leads for measuring cell voltage.
- VI. One filler hole thermometer and Gravity correcting scale.
- VII. Electrolyte shall be prepared from battery grade Sulphuric acid confirming to IS:226 and distilled water confirming to IS:1069 Electrolyte for first filling with 10% extra shall be supplied in non-returnable containers. (Type of electrolyte, Qty per cell, total first filling Qty and total Qty, no. of containers (carboys of 35-liter capacity) may please be specified in GTP).
- VIII. 24 Nos. of cell number plates (1 to 24 No) and fixing pins / screws
- IX. Two Nos of rubber syringe.
- X. Two nos of acid resisting plastic jug each of 2-litre capacity.
- XI. Two nos of acid resisting plastic funnels.

- XII. Lead plated MS or acid proof stainless steel Bolt & nuts. (Size and quantity may please be mentioned in GTP).
  - XIII. Each cell shall be provided with ceramic type vent plug. It shall be anti-splash type, having more than one exit hole and shall allow the gases to escape freely but shall prevent acid from coming out.
  - XIV. Each cell shall be provided with acid and oxidation proof float type level indicators with marking for the electrolyte level for upper-lower-normal limits.
  - XV. Rubber Apron
  - XVI. Rubber Boot and Gloves
  - XVII. Petroleum jelly 250 gms.in packed Tin
  - XVIII. Insulated Spanner set (Indicate size and Nos.in GTP)
  - XIX. Log book for maintenance.
  - XX. Any item not specified above but which is needed for maintenance & efficient working of batteries may be indicated separately without extra cost.
- 3.24 The construction of the stand shall be suitable for mounting on a flat concrete floor. The stand shall be rigid, free standing type and free from warp and twist. The stand should be made up of MS channels/angles with FRP coating of min.5.0 mm or of pure FRP material. The FRP STAND shall also be non-reactant to acid. The stand should be designed considering all aspect of loading and safety, so as to withstand the loading of battery set throughout its life, which shall be supported by load bearing calculation. The lower tier of the stand will be at the height of 300 mm from the ground level. Support angle should be provided for each rack so as to safeguard each battery cell from falling or declining. There shall be sufficient space, at least 400 mm, between two tiers of stand so that maint. of battery cells of lower tier can be done easily. Necessary supports for power cable connected to end takeoff terminals shall be mounted on the stand.

**3.25 QAP:**

Bidder shall submit the Manufacturing Quality Plan showing all the details in the bid.

**4.0 DRAWINGS AND DATA:**

4.1. The bidder shall submit along with their offer the following drawings in Hard and soft copy.

i) Set of GA Drawing for complete battery sets, battery stand and individual battery cell drawing with sectional view.

ii) Technical literature/Manuals

iii) Performance curves/write-up on working of battery. The Data submitted shall be adequate to evaluate the performance/quality of item offered

iv) The detailed drawing showing the size & quantity of steel sections for FRP stands.

4.2. The successful bidder shall submit three sets of following drawings for approval in hard and soft copy.

i) Set of GA Drawing for complete battery sets, battery stand and individual battery cell.

ii) Complete bill of material accessories indicating make, material, quantity, size & type wherever applicable.

iii) Sectional view showing interior construction of the battery cell. It shall also include the information of C/S area of positive and negative plates, container dimensions, type/grade and quantity of electrolyte.

iv) The detailed drawing showing the size & quantity of steel sections for FRP stand.

v) Technical literature/Manuals covering manufacturer's instructions for filling and initial charging of the battery together with starting and finishing charging rate, maintenance instructions and storage conditions of electrolyte and battery cells.

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4.3. The successful bidder shall have to supply the 3 sets of the approved drawings/literature and manuals along with each battery set to be supplied.

## **5.0 PACKING:**

5.1 Battery shall be supplied in dry and uncharged condition suitably packed securely in wooden crates. Packing shall be suitable for handling during transit by Rail / Road and secured to avoid any loss or damage during transit.

## **6.0 TESTS:**

The bidder shall submit the following type test reports as stated hereunder for the offered item along with the offer.

These tests must have been conducted in the **NABL** approved laboratory as per IS 1651 & IEC 60896 – 2-1995 & IEEE 1188 within last 7 years prior to date of validation of the offer.

### **6.1 TYPE TESTS:**

#### **6.1.1 Type Test for Battery cell:**

1. Verification of constructional requirements (As per IS 1651).
2. Verification of marking and packing (As per IS 1651).
3. Verifications of dimensions (As per IS 1651).
4. Capacity test (As per IEC 60896 – 11)
5. Charge Retention Test (As per IEC 60896 – 11)
6. Endurance in discharge – charge cycles (As per IEC 60896 – 11)
7. Endurance in overcharge (As per IEC 60896 – 11)
8. Test of suitability for floating battery operation (As per IEC 60896 – 11)
9. Short circuit current and internal resistance Test (As per IEC 60896 –11)
10. Ampere- hour and watt-hour efficiency tests (As per IS 1651).
11. Test for voltages during discharge (As per IS 1651).
12. Mechanical Test

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**6.1.2 Type test for Battery cell Containers: (As per IS 1146):**

1. High voltage test.
2. Izod impact test.
3. Drop ball test.
4. Plastic yield test.
5. Test for resistance to acid.
6. Hydraulic thrust endurance test.

**6.2 Acceptance Tests for Battery Cells:**

Tests shall be carried out as under at Manufacturer's works:

1. Visual inspection including marking and packing.
2. Dimensional check.
3. Capacity test.
4. Test for voltage during discharge.
5. Battery Impedance Measurement Test.

**6.3 Routine Tests for Battery Cells:**

Tests shall be carried out as under at Manufacturer's works:

1. Visual inspection including marking and packing.
2. Dimensional check.
3. Capacity test.
4. Test for voltage during discharge.
5. Battery Impedance Measurement Test.

Note: - Signature Value (Battery Impedance) of all the cells shall invariably be submitted **after commissioning the battery set at the site.**

The acceptance test certificates shall be submitted for approval, before dispatch of the battery sets in bound volume. Also one set shall be submitted and sent with battery set.

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**7.0 COMMISSIONING:**

The first charging & commissioning of each battery set at site shall be in the scope of the Bid. The successful Bidder/s shall have to carry out first charging & commissioning of each battery set at site. The successful bidder shall arrange for all the necessary equipment, including the variable resistor, tools, tackles, and instruments.

**SCHEDULE OF GURANTEED TECHNICAL PARTICULAR FOR  
48V,250Ah VRLA MAINTENANCE FREE BATTERY**

(To be filled up along with offer of Battery Set)

Sr. No.	Description	Data Furnished by the Manufacturer
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1.	Manufacturer's Name	
2.	Type of Battery	
3.	Applicable Standards	
4.	Expected life in years	
5.	Recommended range of float/boost charging voltage	
6.	Boost charging current	
7.	Float / Trickle charging current	
8.	Open circuit voltage of cell when completely discharged at 27 deg. C	
9.	AH efficiency	
10.	WH efficiency	
11.	Maximum allowable ripple	
12.	Positive Plates	
12.1	Type	
12.2	Materials	
13.	Negative Plates	
13.1	Type	
13.2	Materials	
14.	Containers and cover	
14.1	Type	
14.2	Material	
Sr. No.	Description	Data Furnished by the Manufacturer
15.	Separator	
15.1	Type	

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15.2	Material	
16.	Safety Valve	
16.1	Type	
16.2	Material	
	(i) Housing	
	(ii) Valve	
17.	Terminal connectors, Terminal posts, Nuts & Bolts	
17.1	Inter cell connector	
17.1.1	Size	
17.1.2	Material	
17.2	Terminal post material	
17.2.1	Whether the surface of the terminal post extending above the cell cover including bolt hole shall be coated with an acid resistant and corrosion retarding material.	
17.3	Inter row connector	
17.3.1	Size	
17.3.2	Material	
17.4	Nuts & Bolts Material	
18.	Flame Arrestors	
19.	Battery Racks	
19.1	Type of Material	
19.2	Whether anti-acid coating provided.	
20.	Front covers	
21.	Insulator materials (for racks and cells).	

<b>Sr. No.</b>	<b>Description</b>	<b>Data Furnished by the Manufacturer</b>
22.	Time for which the battery can withstand short circuit at terminals	



23.	Recommended air charges per hour	
24.	Self-discharge per week	
25.	Capacity Requirements	
25.1	Whether the capacity of the battery (Corrected at 27 deg. C shall not be Less than C and not more than 120% of C before any cell in the battery bank reach 1.75 V / cell.	
25.2	Capacity of battery at rate of discharge other than 10 hour discharge rates.	
	C/1	
	C/2	
	C/3	
	C/4	
	C/5	
	C/8	
	C/20	
25.2.1	Whether the battery design permits the charging of battery at 2.45 V per cell (when two cells shorted)	
25.3	Battery voltage when a fully charged battery is put to discharge at C/10 rate	
25.3.1	After 6 minutes of discharge	
25.3.2	After 6 hours of discharge	
25.3.3	After 8 hours of discharge	
25.3.4	After 10 hours of discharge	
26.	Chemical requirements	
26.1	Oxygen recombination efficiency of cell/battery for charges current C/10 under normal working conditions.	

<b>Sr. No.</b>	<b>Description</b>	<b>Data Furnished by the Manufacturer</b>
26.2	Whether cell pressure is sufficient for 99% gas recombination when working at C/10 rate of charge and	

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	ambient temperature of 27 deg. C.	
26.3	Grid corrosion under normal operating conditions.	
26.4	Whether throughout its life, in the operating condition of C/10 rate of charge and C/8 rate of discharge in average ambient temperature of 35 deg. C shedding of battery active material shall not lead to short circuit.	
26.5	Whether growth of positive plate shall be less than 8% of total plate area throughout the specified life.	
26.6	Whether while operating in normal operating conditions, the cell or battery shall not lead to dry out, throughout the life of the battery.	
26.7	Will battery exhibit thermal runaway while working in the average ambient temperature of 35 deg. C, & operating range of 0 to 50 deg. C, and at a charge rate of C/10 and discharge rate of C/8.	

**DATA REQUIREMENT SHEET FOR BATTERIES FOR DCPS FOR 250 AH CAPACITIES/LOAD 25 Amp.**

Sr. No.	Description	Data Furnished by the manufacturer
1.	Manufacturer's Name	

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2.	For required load (Amp)	
3.	Battery backup duration required	
4.	Nominal DC voltage	
5.	Model No. of Cell	
6.	No. of Cells	
7.	Guaranteed AH capacity at ten <u>hours</u> discharge rate to 1.75 V per cell at 27 deg. C.	
8.	Minimum duration for which battery can supply power to device (as per battery sizing submitted)	
9.	Short circuit current at battery (cell) terminals (Approx) $\pm 10\%$	
10.	Internal resistance of each cell under fully charged condition in milliohms (Approx) $\pm 5\%$	
11.	Cell dimensions (mm) (L x W x H) $\pm 5$	
12.	Recommended cell centers distance (mm) after erected in steel tray (Approx).	
13.	Module outline dimensions (mm) (L x D x H) $\pm 5$	
14.	Net weight (kg) (Approx)	
15.	Weight per cell (kg) (Approx).	
16.	Total shipping weight of battery bank (kg) (Approx)	

**Amendment - I to the Technical Specifications  
(GETCO/E/TS-BATT VRLA 03102, R0 Jan 2021)  
for 50V, 250Ah VALVE REGULATED MAINTENANCE FREE LEAD ACID BATTERY SETS**

**Date: 26.05.2022**

S/N	Clause No.	Item	Existing Specification	Amended Specification
1	1.1	SCOPE	This specification covers the design, manufacture, Supply & testing of 50V, 250 Ah, HDP/ Hard Rubber Container lead acid tubular battery set (with tubular positive plates) VRLA Maintenance free high performance battery sets at the manufacturer's works and supply at site including FRP stand and all accessories mentioned in this specification.	This specification covers the design, manufacture, Supply & testing of 50V, 250 Ah, non-porous Hard Rubber/ Styrene Acrylonitrile (SAN) Container lead acid tubular battery set (with tubular positive plates) VRLA Maintenance free high performance battery sets at the manufacturer's works and supply at site including FRP stand and all accessories mentioned in this specification.
2	3.22	General Requirements	The cell container shall be closed type made from non-porous Hard Rubber. The material shall have chemical & electrochemical compatibility and shall be acid & heat resistant. The container and cover shall be capable of withstanding the rigorous of transport, storage and handling and shall be free from flaws. Sufficient space for sediments shall be provided.	The cell container shall be closed type made from non-porous Hard Rubber / Styrene Acrylonitrile (SAN). The material shall have chemical & electrochemical compatibility and shall be acid & heat resistant. The container and cover shall be capable of withstanding the rigorous of transport, storage and handling and shall be free from flaws. Sufficient space for sediments shall be provided.

**CHECK LIST FOR High Discharge Performance Tubular LEAD ACID BATTERY SET**

<b>Supplier</b> :-
<b>Manufacturer</b> :-
<b>Project</b> :-
<b>Tender No./ Order No.</b> :-
<b>Battery Set Rating</b> :- 50V, 250/350/600Ah Battery set
<b>Drawing /Document No.:</b> - Drg. No. _____, BOM Doc. No. _____ & MQP Doc. No. _____
<b>Quantity</b> :- _____ Sets

**Date:**

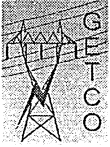
Sr. No.	Data / Item of Verification	Design data		Remarks
<b>A</b>	<b>Drawings</b>			
	<b>Battery Cell</b>			
1	Rating	2V, 25/350/600 AH		
2	Type	High Discharge Performance Tubular Lead Acid Battery Set		
3	Designation			
4	No. of Cells	25		
5	Sectional View	As per Drawing		
6	Dimensions			
	- Height (mm)	_____ mm		
	- width (mm)	_____ mm		
	- Depth (mm)	_____ mm		
7	Container			
	- Material			
	- Thickness (mm)	_____ mm		
8	Positive plates			
	- Type	Tubular		
	- Material	Lead /Lead Oxide		
	- Size			
	-- Height (mm)	_____ mm		
	-- Thickness (mm)	_____ mm		
	-- Area (sq.mtr) (H x W)	_____ Sq.mtr		
	- Nos. of Plates	_____ Nos.		

<b>Supplier :-</b>				
<b>Manufacturer :-</b>				
<b>Project :-</b>				
<b>Tender No./ Order No. :-</b>				
<b>Battery Set Rating :- 50V, 250/350/600Ah Battery set</b>				
<b>Drawing /Document No.:- Drg. No. _____, BOM Doc. No. _____ &amp; MQP Doc. No. _____</b>				
<b>Quantity :- _____ Sets</b>				
<b>Date:</b>				
<b>Sr. No.</b>	<b>Data / Item of Verification</b>	<b>Design data</b>		<b>Remarks</b>
	- Total area (sq.m)			
9	Negative plates			
	- Type	Flat pasted		
	- Material	Lead /Lead Oxide		
	- Size			
	-- Height (mm)	_____ mm		
	-- Thickness (mm)	_____ mm		
	-- Area (sq.mtr) (H x W)	_____ Sq.mtr		
	- Nos. of Plates	_____ Nos.		
	- Total area (sq.m)			
10	Separator			
	- Material	Low resistance absorbent microporous glass fiber material		
	Size of separator (L x W x TH)	____ X ____ X ____ mm		
	Nos. of separator	_____ Nos.		
11	Vent plug			
	- Type	Anti-splash type ceramic		
	- Material	Ceramic		
12	Electrolyte			
	- Type/Grade	Battery grade Sulphuric Acid		
	- Quantity per cell (Ltr)	_____ Ltr.		
	- 10% extra Quantity (Ltr)	_____ Ltr		
	- Total Quantity per cell (Ltr)	_____ Ltr.		
13	Weight of Cell (Kg.)			
	- Without electrolyte	_____ kg		
	- With electrolyte	_____ Kg		
14	Connectors			
	- Material	Lead plated copper		
	- Lead coating (Min.)	50 microns		
	- Dimensions	Min. 4 mm thick		
	-- Inter-cell connectors (L x W x TH)	____ x ____ x ____ mm		
	-- Inter-row connectors	____ x ____ x ____ mm		
	-- Inter-tier connectors			
	-- Lugs for cable	50 Sq. mm 3 Nos.		

<b>Supplier :-</b>				
<b>Manufacturer :-</b>				
<b>Project :-</b>				
<b>Tender No./ Order No. :-</b>				
<b>Battery Set Rating :- 50V, 250/350/600Ah Battery set</b>				
<b>Drawing /Document No. :- Drg. No. _____, BOM Doc. No. _____ &amp; MQP Doc. No. _____</b>				
<b>Quantity :- _____ Sets</b>				
				<b>Date:</b>
<b>Sr. No.</b>	<b>Data / Item of Verification</b>	<b>Design data</b>		<b>Remarks</b>
16	Nut-Bolts, washers			
	- Material	Lead plated M.S/S.S		
	- Size	5/16 x 1 & 1/2 x Full Thread		
17	Total weight of Battery set (Kg.)	_____ Kg (+/- 5 %)		
<b>Battery Stand</b>				
18	Material			
19	Thickness of FRP coating (mm, Min.)	_____ mm		
20	Size of Channels / Angles	_____ X _____ X _____ mm		
21	Size of Supports	_____ X _____ X _____ mm		
22	Stand insulators			
	- Material	Hard rubber		
	- Size	100 x 100 mm		
	- Nos.	_____ Nos.		
23	Height of lower tier from the ground (mm, Min.)	_____ mm		
24	Space between lower tier cell & bottom of the upper tier (mm, Min.)	_____ mm		
25	Height of Upper tier from the ground (Total height of the stand), (mm, Max.) (mm, Max.)	_____ mm		
26	Total height (mm, Max.)	_____ mm		
27	Length of the stand (mm, Max.)	_____ stands of _____ mm		
28	Width of the stand (mm, Max.)	_____ mm of each stand		
29	Weight of the stand (Kg.)	_____ Kg /Stand		
<b>B Bill of Quantity</b>				
1	Battery cells	25 Nos.		
2	Battery Stands	_____ No.		
3	Stand insulators	_____ Nos.		
4	Cell insulator	_____		
5	Inter-cell connectors - long	_____ Nos. ( __ x __ x __ mm)		
6	Inter-cell connectors - short	If any		
6	Inter-row connectors	_____ Nos. ( __ x __ x __ mm)		
7	Inter-tier connectors	If any		

<b>Supplier :-</b>				
<b>Manufacturer :-</b>				
<b>Project :-</b>				
<b>Tender No./ Order No. :-</b>				
<b>Battery Set Rating :- 50V, 250/350/600Ah Battery set</b>				
<b>Drawing /Document No. :- Drg. No. _____, BOM Doc. No. _____ &amp; MQP Doc. No. _____</b>				
<b>Quantity :- _____ Sets</b>				
				<b>Date:</b>
<b>Sr. No.</b>	<b>Data / Item of Verification</b>	<b>Design data</b>		<b>Remarks</b>
9	Lugs for cable (50 sq. mm)	_____ Nos.		
10	Lead plated MS Nut-Bolts, washers	_____ Sets. + 5 Sets Extra		
11	Ceramic Vent plug	_____ Nos. ( ___ per cell)		
12	Syringe type Hydrometer with stand	1 No.		
13	Digital Cell tester ( Multimeter)	1 No.		
14	Thermometer with stand	1 No.		
15	Gravity correcting scale	1 No.		
16	Electrolyte Qty. (first filling + 10% extra) in Ltr	_____ Ltr.		
17	No of carboys (35 ltr)	_____ Nos.		
18	Acid filler (Rubber Syringe)	1 No.		
19	Acid Resistance plastic jug (2 Ltr capacity)	1 No.		
20	Acid Resistance Funnels	1 No.		
21	Cell Number plates with fixing pins / screws	25 Nos.		
22	Spanners	2 Nos.		
23	Petroleum Jelly .	250 gms		
24	Rubber boot & Gloves	1 pair each		
25	Rubber apron	1 No.		
26	Battery Log book	1 No.		
27	Installation, commissioning and O & M manual with drawing for battery set	1 set		
28	FQP	1 copy		





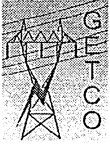
Dated: 08.09.2020

### TTR validity amendment-1

(Addendum to Technical Specification for validity of type test reports  
for major electrical equipments)

Sr. No.	Name of test/ Equipment	Type test reports validity (In Years)
i.	On Line Tap Changer (OLTC)	10
ii.	Power Transf. Bushing/ Reactor Bushing	7
iii.	Transformer/reactor fittings and accessories.	10
iv.	Circuit Breaker	10
v.	Isolators	10
vi.	Lightning Arrestors	10
vii.	Wave Trap	10
viii.	Instrument Transformer	7
ix.	Low Voltage (LV) & Medium Voltage (MV) Switchgear	10
x.	Cable & associated joints	10
xi.	Capacitors	10
xii.	Energy Meters [including smart meters & Availability Based Tariff (ABT) meters]	5
xiii.	Conductors & earth wire	10
xiv.	Insulators(Porcelain/ Glass)	10
xv.	Composite Insulators	5
xvi.	Power Line Carrier Communication (PLCC)/Fibre Optic (FO) cable/Optical Ground Wire (OPGW)	5
xvii.	Terminal connectors of all major equipments including transformers	10

**Note:** Type test reports shall be valid as on the last date of submission of bid.



Dated: 08.09.2020

## TTR validity amendment-2

(Addendum to Technical Specification for validity of type test reports of *all the equipments*)

The validity of type test reports to be submitted with technical bid shall be considered as per following:

*“Type test reports shall be valid as on the last date of submission of bid”*