ANNEXURE A

SPECIFICATION

TRANSNET
freight rail

A Division of Transnet SOC Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

REQUIREMENT FOR THE SUPPLY OF BATTERIES FOR 3 kV DC TRACTION SUBSTATION

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1	08/11/2019			Original Edition
2	17/07/2020	1	4	Amended Scope
		2	4	Added background
		3	4	Additional/amended normative references
		4	5	Added mechanical and electrical conditions
		5	5	Updated to technical requirements
		5.1	5	General requirements for 2 battery types
		5.2	6	Vented lead-acid batteries
		5.3	6	Valve-regulated lead-acid batteries
		6	6	Testing and inspection
		10	7	Packaging, storing and handling

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1.0 SCOPE

1.1 This specification details Transnet's requirements for the supply of stationary Plantè vented lead-acid batteries or Gel valve-regulated lead-acid batteries.

1.2 This specification contains schedule of requirements (Appendix A) which shall be completed by the relevant Transnet Representative.

1.3 This specification contains technical datasheet (Annexure B) which shall be completed by the supplier and must be submitted as part of the tender documents.

2.0 BACKGROUND

Batteries are used in 3 kV DC traction substations for the following purposes:

- Tripping and closing of primary circuit breakers.
- Supply to protection relays.
- Closing and holding coil supply to DC high speed circuit breakers.
- 110 V DC supply to control panel.

Currently, Plantè Lead-Acid batteries are used in 3 kV DC traction substations for the supply to protection and control equipment when there is a loss of the auxiliary power supply. However, due to the maintenance intensive nature of this battery type, newer battery types have been investigated to replace Plantè Lead-Acid batteries.

One of the battery types investigated and approved includes Gel valve-regulated lead-acid batteries that were piloted in Bon Accord 3 kV DC traction substation for performance testing. This specification serves as a temporary solution aimed at allowing for the procurement of either Plantè vented or Gel valve-regulated lead-acid batteries, based on the depot requirements, while other technologies are being tested.

3.0 NORMATIVE REFERENCES

Unless otherwise specified all materials used and equipment developed and supplied shall comply with the current edition of the relevant South African National Standards (SANS) or Transnet publications where applicable.

The following publications/specifications (latest editions) are referred to herein:

3.1 SOUTH AFRICAN NATIONAL STANDARDS (SANS)

SANS 9001	Quality Management systems.
SANS 60896-11	Stationary lead-acid batteries. Part 11: Vented types - General requirements and methods of test
SANS 6089-21	Stationary lead-acid batteries Part 21: Valve regulated types - Methods of test
SANS 60896-22	Stationary lead-acid batteries Part 22: Valve regulated types – Requirements
SANS 61056-1	General purpose lead-acid batteries (valve-regulated types) Part 1: General
SANS 61429	Marking of secondary cells and batteries with the international recycling symbol ISO 7000-1135

3.2 TRANSNET SPECIFICATIONS

BBB 2502	Requirements for battery chargers for 3kV DC traction substations.

4.0 SERVICE CONDITIONS

4.1 ENVIRONMENTAL CONDITIONS

Altitude:	0 - 1800 m above sea level
Relative humidity:	10% to 90%
Ambient temperature:	-10° C to +55° C

4.2 MECHANICAL CONDITIONS

4.2.1 The batteries shall be designed to withstand all mechanical stresses, vibrations and shocks occurring in normal transportation, handling and use in accordance with clause 4 of SANS 60896- 11.

4.3 ELECTRICAL CONDITIONS

4.3.1 Batteries shall be connected to the battery charger with a 110 V DC supply with voltage regulation in accordance with clause 7.4.1 of BBB 2502.

4.3.1.1 All battery components, connectors and terminals shall be designed for current rates as specified in SANS 61056-1.

5.0 TECHNICAL REQUIREMENTS

5.1 GENERAL

5.1.1 The battery types allowed in 3 kV DC traction substations shall be limited to Plantè vented lead-acid batteries or Gel valve-regulated lead-acid batteries.

5.1.2 The batteries procured shall be rechargeable and compatible with the battery charger specified in BBB 2502 for 3 kV DC traction substations.

5.1.3 The battery type and capacity required shall be specified by TFR in Appendix A.

5.1.4 Each battery set shall comprise of a series connection of 55 cells or equivalent, depending on the nominal voltage per cell to supply the nominal output voltage range of 110 V DC.

5.1.5 The recommended nominal voltage per cell is 2 V DC, to allow for 5.1.6.

5.1.6 All intercell connectors shall accommodate for higher operating temperature conditions resulting from high rate discharge as per clause 6.10 of SANS 60896-22.

5.1.7 The covers and containers used for individual cells shall be spill-proof.

5.2 VENTED LEAD ACID BATTERIES

5.2.1 The vented type battery technology for 3 kV DC traction substations shall be Plantè Lead-Acid batteries.

5.2.2 The allowable rated capacity of these batteries shall range between 100-150 Ah, as per schedule of requirements and manufacture's design.

5.2.3 The nominal output voltage for the batteries shall be 110 V DC

5.2.4 Each cell shall be equipped with markings or a device that indicates the minimum and maximum electrolyte levels in accordance with clause 5 of SANS 60896-11.

5.2.5 The battery shall be capable of delivering minimum of 10 A for 10 hours, as defined in clause 7 of SANS 60896-11, with corresponding final voltage and discharge current values per cell.

5.2.6 The batteries shall be designed to operate under float conditions in accordance with clause 8 of SANS 60896-11.

5.3 **VALVE-REGULATED GEL LEAD-ACID BATTERIES**

5.3.1 The valve-regulated type battery technology for 3 kV DC traction substations shall be Gel Lead-Acid batteries.

5.3.2 The allowable rated capacity of these batteries shall range between 100-200 Ah, as per the schedule of requirements and manufacture's design.

5.3.3 The nominal output voltage for the batteries shall be110 V DC.

5.3.4 The batteries shall be designed to operate under floating batteries conditions defined in clause 3.7 of SANS 60896-22.

5.3.5 All functional requirements including safe operation, performance and durability of valve-regulated batteries shall comply with clause 4 of SANS 60896-22.

6.0 TESTING AND INSPECTIONS

6.1 Any additional, relevant sample tests or visual examinations may be agreed upon by the supplier and the Transnet Freight Rail, Technology Management (Electrical Technology) department representative in accordance to clause 14 to clause 20 of SANS 60896-11 for Plantè lead-acid batteries.

6.2 Any additional, relevant sample tests or visual examinations may be agreed upon by the supplier and the Transnet Freight Rail, Technology Management (Electrical Technology) department representative in accordance to SANS 60896-21 for Gel lead-acid batteries.

6.3 Valve operation testing results as per clause 8.6 of SANS 860896-22 shall be submitted to the relevant Transnet Freight Rail, Technology Management (Electrical Technology) department representative.

6.4 A Transnet Freight Rail, Technology Management (Electrical Technology) department representative may request any additional test deemed necessary to ensure compliance and reserves the right to be present at all tests and inspections as called for in this clause.

6.5 Transnet Freight Rail reserves the right to carry out any check tests on data submitted. However, the successful tenderer will still be responsible for efficient operation of the equipment in service and its compliance with the specification.

7.0 RATING PLATE AND INSTRUCTION LABELS

7.1 Cell and battery markings shall comply with clause 21 of SANS 60896-11.

7.2 The marking of cell polarity shall comply with clause 24 of SANS 60896-11.

7.3 Additional information and labelling required in battery rooms shall comply with clause 23 of SANS 60896-11.

7.4 Markings for recycling symbols on battery cells shall comply with SANS 61429.

8.0 DOCUMENTATION

8.1 Drawings and technical documentation shall be submitted with tender in English.

8.2 The manufacturer must provide one soft copy and two hard copies of the technical specification.

8.3 The manufacturer must provide one soft and two hard copy of the method of installation and mounting details.

8.4 All wiring and component diagrams must be provided to Transnet.

8.5 The manufacturer must provide one soft copy and two hard copies of maintenance manual.

8.6 The manufacturer must provide design and type test certificates to verify conformance to the

requirements and these must be submitted with tender documents.

8.7 Supplier shall advise how to dispose of the equipment at the end of its operating life, taking into consideration environmental requirements and regulations.

8.8 The tender documentation should cover all of the design requirements recommended in this specification.

8.9 Instructions for installation of individual components of assembly rack and battery set shall be provided by manufacturer.

9.0 QUALITY ASSURANCE AND COMPLIANCE

9.1 The equipment and materials used to manufacture the equipment, shall be of high quality design and manufacture, and shall comply with the relevant clauses outlined in this specification.

9.2 Where the equipment or material does not comply with the relevant specifications, the documentation must be submitted to the relevant Transnet Freight Rail, Technology Management (Electrical Technology) department representative.for approval.

9.3 Components must have a final quality inspection done by Transnet Freight Rail, Technology Management (Electrical Technology) department representative. prior to installation.

9.4 The successful tenderer shall maintain a Quality Management System (QMS) based on or certified to SANS 9001.

9.5 The tenderer shall indicate clause by clause whether his tender complies in all respects, and where alternative offers are submitted these shall be indicated to be assessed by the Transnet Freight Rail, Technology Management (Electrical Technology) department representative.

9.6 The successful tenderer shall submit drawings of the designs for retention by Transnet Freight Rail, Technology Management (Electrical Technology) department.

10.0 PACKAGING, STORAGE AND HANDLING

10.1 All batteries shall be delivered in the complete set of 55 cells, along with connectors and battery rack as a complete set.

10.2 Each package must be clearly marked indicating the equipment contained within the package and handling instructions.

10.3 Storage instructions for new batteries shall be clearly indicated in documentation available in packaging.

11.0 GUARANTEE AND DEFECTS

11.1 The appointed tenderer shall guarantee that the all supplied individual components of the batteries conform to Transnet's requirements.

11.2 The appointed tenderer shall accept liability for makers' defects, which may appear in design, material and workmanship.

11.3 The appointed tenderer shall provide all information regarding guarantees and warranties in writing.

12.0 METHOD OF TENDERING

12.1 Tenderers shall indicate clause-by-clause compliance document with the specification. This shall take the form of a separate document listing each of the specification's clause and sub-clause numbers, indicating the individual statements of compliance or non-compliance.

12.2 Statement of non-compliance shall be motivated by the tenderer, as per 11.1.

12.3 Tenderers shall submit comprehensive literature consisting of detailed technical specifications,

general constructional details and principal dimensions, maintenance schedules, datasheets, together with clear illustrations of the equipment offered.

12.4 Any items offered in accordance with other standards will be considered at the sole discretion of Transnet. The tenderer shall supply full details stating where the item differs from these specifications as well as supplying a copy (in English) of the recognized standard specification(s) with which it complies. Any deviations must be approved by Transnet Freight Rail, Technology Management (Electrical Technology) department in writing.

12.5 Failure to comply with clauses 12.1, 12.2, 12.3 and 12.4 could preclude a tenderer from consideration.

12.6 In the event of any conflict between the various submitted relevant documents, the order of precedence shall be, and in consultation with Transnet Freight Rail, Technology Management (Electrical Technology) department:

12.7 a) Legal and safety requirements.

12.8 b) This Specification.

APPENDIX A: SCHEDULE OF REQUIREMENTS

The schedule of requirements should be completed by circling relevant characteristics, as per procurement requirements.

(To be completed by relevant Transnet Freight Rail Representative)

Battery type	Plantè	Gel	
Capacity requirements (Ah)	100 Ah	150 Ah	200 Ah
Assembly rack required	Yes	No	
Hydrometer required (only for Plantè to measure SG levels)	Yes	No	

Completed by .....

Capacity .....

Signature .....

Date .....

ANNEXURE B: TECHNICAL DATA SHEET

(To be completed by the tenderers and submitted as part of their tender)

	Battery	
	Manufacturer	
	Manufacture date and inspection date	
	Battery type	
	Rated Capacity (Ah)	
	Weight per cell (kg)	
	Nominal voltage per cell (V)	
	No. of cells	
	Float voltage per cell (V)	
	Boost voltage per cell (V)	
	Equalising voltage per cell (V)	
	Final voltage per cell (V)	
	Dimensions of cell	
	Dimensions of assembly rack (if applicable)	
	Material of cell cover and container	
	Material of assembly rack (if applicable)	
	Material of intercell connector	
	Flammability rating of materials (Attach document)	
	Discharge capacity performance results (Attach documents)	
	Service life (years)	
	Internal resistance (Ohms)	