

ANNEXURE A1 TECHNICAL SPECIFICATION CLAUSE BY CLAUSE PD_PEL_NAT_URS_003

Electric locomotive replacement battery cell requirements. Values of proposed product to be indicated in the “resp” column

| Item no | Ampere-Hour (Ah) | | Voltage per cell (V) | | Battery Cell dimensions LxWxH (mm) | | VRLA (yes/no) | Weight (kg) | |
|---------------------------|------------------|------|----------------------|------|------------------------------------|------|---------------|-------------|------|
| | spec | resp | spec | resp | spec | resp | resp | spec | resp |
| 085830481(5 cell battery) | 195(C10) | | 2,2 | | 445x180x480 | | | 75 | |
| 085831182(single cell) | 195(C10) | | 2,2 | | 78x158x414 | | | 14 | |

The batteries to be offered shall comply fully with the following standards. If non-compliant to indicated spec, indicate alternative spec used.

SANS 60077-1:1999 (Railway applications – Electrical equipment for rolling stock. General service conditions and general rules.).

| | 085830481 | 085831182 |
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| Comply(y/n) | | |

SANS 60254-1:2005 (Lead-acid traction batteries - General requirements and methods of test.).

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| Comply(y/n) | | |

SANS 61373:2010 (Railway applications - Rolling stock equipment – Shock and vibration tests.).
Category 1b must be used for the vibration test based on SANS 61373.

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| Comply(y/n) | | |

BS EN 45545-2:2013. (Railway applications – Fire protection on railway vehicles. Requirements for fire behaviour of materials and components.)

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| Comply(y/n) | | |

BS EN 45545-5:2013. (Railway applications – Fire protection on railway vehicles.)

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| Comply(y/n) | | |

BS EN 50547:2013. (Railway applications – Batteries for auxiliary power supply systems.)

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| Comply(y/n) | | |

BS EN 60695-11-10:2015. (Fire hazard testing. 50 W flame test methods.)

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| Comply(y/n) | | |

BS EN 60707:1999. (Flammability of solid non-metallic materials when exposed to flame sources.)

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| Comply(y/n) | | |

ISO 9001: Quality

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| Comply(y/n) | | |

ISO14001: Environmental management

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| Comply(y/n) | | |

The type of batteries shall be maintenance free, sealed; valve regulated lead-acid (VRLA) batteries

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| Comply(y/n) | | |

The nominal discharge capacity of the batteries must be stated @ 10 hour to 1.8V per cell for the 2.2V cells as specified:

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| | 085830481 | 085831182 |
| Amp value | | |

The high-rate discharge capacity of the batteries must be stated @ 1 hour to 1.6V per cell for the 2.2V cells as specified in table 1.

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| | 085830481 | 085831182 |
| Amp value | | |

Service life of batteries must be at least 7 years at 25 °C and cycle life must be 1000 cycles at 80% DOD (depth of discharge)

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| Comply(y/n) | | |

Recommended storage and operating temperatures should range between ~5 °C ~ 50 °C for storage; ~5 °C ~ 45 °C for discharge and 0 °C ~ 40 °C for charging.

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| Comply(y/n) | | |

Operational humidity should be up to 90% non-condensing.

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| Comply(y/n) | | |

The date of manufacture should be not more than three months before delivery and preferably has to be hard time stamp on the battery.

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| Comply(y/n) | | |

The battery shall be supplied complete with connectors between cells and at the main positive and negative terminals. The connectors shall be of robust construction of adequate size to minimize voltage drop and be made of flexible insulated copper conductor cable. The inter-connectors and terminals shall be fully insulated.

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| Comply(y/n) | | |

The batteries must fit the existing battery container; the outer dimensions of the battery container are listed in the spec

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| Comply(y/n) | | |

Locomotive model and battery container dimensions. Values of proposed product to be indicated in the “resp” column

| Item no | Battery container | | | | | | | |
|-----------|-----------------------------------------|------|---------------------|------|----------|------|--------------|------|
| | Dimensions LxWxH (mm) | | Wall thickness (mm) | | Quantity | | Composition | |
| | spec | resp | spec | resp | spec | resp | spec | resp |
| 085830481 | 480 x 180 x 445 (containing 5 cells) | | 5 | | 8 | | Polyethylene | |

The shipped cells shall be fully charged, ready to be installed at site and should give a capacity of not less than 90% of rated value when tested at site at any time up to 6 months of its receipt.

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| Comply(y/n) | | |

Item 085830481

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| Type, composition and volume of electrolyte should be stated |
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| Make, material, number and minimum plate thickness shall be stated |
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| Internal pressure which the container can stand should be stated |
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| Maximum discharge current and recharge voltage should be stated |
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| The separator shall be low resistance micro porous material |
| Comply(y/n) |
| Terminals shall be fastened with non-capsulated bolts |
| Comply(y/n) |
| Test results must be supplied to confirm capacity at 10-hour discharge to 1.8 Volts per cell |
| Test results attached to tender (y/n) |

Item 085831182

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| Type, composition and volume of electrolyte should be stated |
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| Make, material, number and minimum plate thickness shall be stated |
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| Internal pressure which the container can stand should be stated |
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| Maximum discharge current and recharge voltage should be stated |
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| The separator shall be low resistance micro porous material |
| Comply(y/n) |
| Terminals shall be fastened with non-capsulated bolts |
| Comply(y/n) |
| Test results must be supplied to confirm capacity at 5-hour discharge to 1.7 Volts per cell |
| Test results attached to tender (y/n) |

Polyethylene battery boxes: Polyethylene compound requirements

Self-extinguishing

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| Comply(y/n) | | |

Adhere to UL-94HB, horizontal test based on specified requirements in BS EN 60695-10-11:2015

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| Comply(y/n) | | |

Adhere to UL-94V-1, vertical test based on specified requirements in BS EN 60695-10-11:2015

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| Comply(y/n) | | |

Low, non-toxic smoke emissions

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| Comply(y/n) | | |

The tenderer shall give the supplier's / manufacturer's technical data with the tender including the following. To be supplied as a data pack for each battery type (per item no).

- Model number
- Number of poles per cell
- Charge, discharge characteristics, and values for boost, float equalizing modes.
- Maximum internal resistance of the battery
- The cycle life with DOD (depth of discharge) characteristics
- Temperature effects on performance and capacity
- Self-discharge characteristics

- Storage conditions and relationship curves between remaining capacity and storage with different capacity at different temperature.
- Relationship between OCV and DOD
- Shock and vibration test certificate with pass criteria as defined in SANS 60095-1 and SANS61373.

The supplier shall provide a list of all material included with each battery set for example, bolts, washers, inter cell bolt-on flexible connector, inter battery bolt-on flexible connector, battery to cable connector etc.

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