TECHNOLOGY MANAGEMENT

TRACTION AND LOCOMOTIVE INTEGRATION TECHNOLOGY

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Specification			
File Ref:	**43D and 44D GPS Receiver CMOS Battery Specification**		**Document no: BBH8405**
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EXECUTIVE SUMMARY

This document defines the technical specifications, performance requirements, and application guidelines for the rechargeable lithium coin cell battery used in the GPS receivers of Class 43D and 44D locomotives. The battery provides a stable backup supply to the receiver's real-time clock (RTC) and volatile memory during power interruptions, thereby preserving time accuracy, data integrity, and compliance with operational safety requirements.

KEYWORDS: **RTC, GPS, CMOS**

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1 Introduction

The GPS receivers installed on Class 43D and 44D Transnet Freight Rail locomotives require a reliable backup power source to sustain their real-time clock (RTC) and volatile memory functions during periods when locomotive power is unavailable. A rechargeable lithium coin cell battery fulfills this role by preserving critical data and maintaining system accuracy. This document specifies the detailed technical, mechanical, electrical, and environmental requirements for such a battery, providing a standard framework to guide procurement, installation, testing, and maintenance activities.

2 Applicable Documents

BBH8331 – 43D/44D GPS Receiver CMOS Battery – Materials Reference
IEC 60086-4: Safety requirements for lithium batteries (primary and secondary).

3 Technical Description

Parameter	Requirement
Battery Type	Rechargeable lithium coin cell
Application	GPS receiver CMOS backup (real-time clock and volatile memory retention)
Nominal Voltage	3.0 V
Nominal Capacity	≥ 100 mAh (measured at 15 kΩ continuous discharge to 2.0 V at 20 °C)
Chemistry	Rechargeable lithium (secondary)
Cycle Life	Minimum 500 cycles at 20% depth of discharge, tested in accordance with IEC 61960

4 Functional Requirements

- Continuous Backup Power: The battery shall provide uninterrupted power to the GPS receiver's real-time clock (RTC) during locomotive shutdowns.
- Data Integrity: The battery shall maintain volatile memory data integrity for a minimum of three (3) years under normal operating conditions.
- Voltage Stability: The battery shall deliver a stable output of not less than 2.5 V throughout its usable service life.
- Automatic Recovery: Upon restoration of locomotive power, RTC and memory functions shall resume seamlessly without manual intervention.
- Storage Retention (recommended addition): The battery shall retain at least 80% of rated capacity after 12 months of storage at 25 °C.

5 Mechanical Specifications

Parameter	Requirement
Diameter	17.8 mm ± 1.0 mm
Height / Thickness	3.0 mm ± 0.2 mm
Maximum Installed Height	≤ 25.5 mm
Tab Dimensions	Width: 4.01 mm ± 0.10 mm; Length: 0.65 mm ± 0.05 mm
Tab Material & Thickness	Stainless steel, Pb-free, thickness 0.20 mm ± 0.02 mm
Welding Strength	≥ 19.6 N (vertical pull test, from welding plate)
Insulation	Protective insulating tube compliant with IEC 60086-4 safety requirements
Weight	Approximately 4.1 g ± 0.3 g

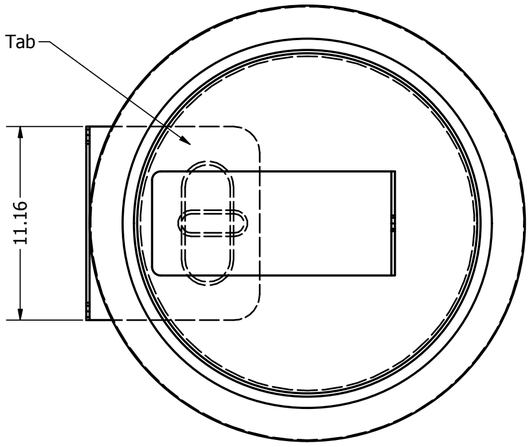
6 Electrical Characteristics

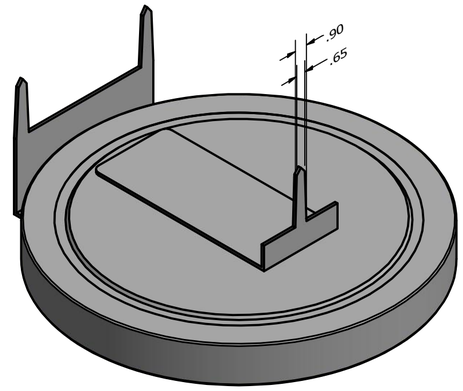
Parameter	Requirement
Nominal Voltage	3.0 V
Discharge Cut-off Voltage	2.0 V (measured at 20 °C)

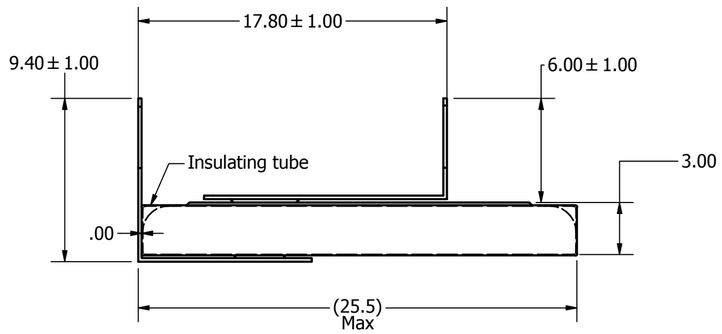
Nominal Discharge Current	0.3 mA (continuous)
Nominal Charge Current	4.5 mA (standard charge rate)
Nominal Capacity	≥ 100 mAh (measured at 15 kΩ continuous discharge to 2.0 V at 20 °C)
Charge Voltage	3.1 V ± 0.15 V (constant voltage charging, with current taper to ≤ 0.5 mA)
Internal Resistance	≤ 50 Ω (fresh cell at 25 °C, measured by AC impedance at 1 kHz)
Voltage Stability	Output must remain ≥ 2.5 V during rated service life under nominal load conditions
Safety Performance	No leakage, swelling, or venting permitted during charge/discharge within specified operating range

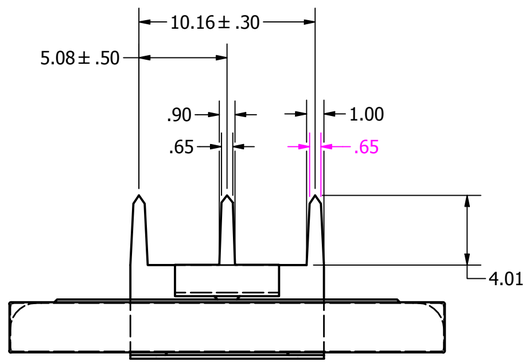
7 Environmental Conditions

- Operating Temperature Range: –20 °C to +60 °C (continuous operation)
- Storage Temperature Range: –20 °C to +70 °C (up to 12 months, at ≤ 60% state of charge)
- Vibration Resistance: Compliant with IEC 60068-2-6 (10–500 Hz, 0.75 mm amplitude, 1.0 g acceleration)
- Shock Resistance: Compliant with IEC 60068-2-27 (half-sine, 150 m/s², 11 ms duration, 3 axes)
- Humidity Resistance: 95% RH at 40 °C for 48 hours, with no leakage, swelling, or capacity loss exceeding 10%
- Altitude / Pressure Tolerance (recommended addition): Must operate without leakage or deformation up to 15,000 m equivalent altitude (in accordance with UN38.3 transport testing)









Tab material: Plate stainless steel with Pb free
Tab thickness: 0.2mm
Welding strength of tab: Min. 19.6N
(Vertical direction from welding plate)

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MATERIAL		
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