

Bender

Approval of Tier 2 and Tier 1 Rail System Insulation Monitoring Has Paved the Way for Widespread Upgrades across the UK



Full approval of rail safety technology from Bender has enabled more widespread investment in intelligent insulation monitoring of signal power systems in the UK.

The new generation multi-tier RS4 Rail Signalling Power Monitoring delivers increased sensitivity for first fault location and remote condition monitoring of core-to-

earth failures, which accounts for most faults on signal power systems. RS4 helps to reduce maintenance, infrastructure and service failures and improve staff safety by minimising trackside intervention ('boots on ballast').

Bender RS4 technology was developed in collaboration with Network Rail in response to the standard NR/L2/SIGELP/27725 which defines requirements for insulation monitoring and fault location for use on

IT electrical systems where the nominal system voltage does not exceed 1000V AC or 1500V DC. Network Rail regulation NR/L3/SIGELP/50001 requires an increase in intervention windows. Faults identified at critical stages (20kΩ or lower) require immediate intervention within 24 hours. Advanced monitoring and insulation fault location at up to 100kΩ increases intervention time, enabling fault identification within a prescribed six-week window. More importantly, it also offers the option of dealing with the fault over a longer timescale through planned and predictive maintenance.

Bender systems were the principal method of tracking and locating faults on the UK rail signalling power network for two decades. However, less critical emerging faults at lower intervention/insulation limits have been difficult to track and pinpoint.

Network Rail demands maximum visibility to assess the health and condition of its power systems to support signals, points and communications infrastructure. Manual cable testing on a five-year cycle continues to be a requirement, but RS4 is a key step forward in enabling Network Rail to move from periodic testing to a real-time condition-based approach through continuous monitoring.

Tony Edwards, Rail Business Manager from Bender UK commented: *“The response from our customers to the Tier 1 and 2 RS4 approval has been very positive. It is being taken on board across the rail network as a straightforward way of upgrading legacy installations to deliver the extra functionality and sensitive monitoring that is set to be the new base level going forward. It is the area where we expect to see growth from companies carrying out improvements – with less new rail developments planned, any future investment is being concentrated on improving existing systems.*

For example, the standard has not yet been reviewed but the future architecture for new principal supply points (PSPs) may be a single transformer for every single feeder. If that is adopted as the new standard, RS4 Tier 2 is the ideal equipment to monitor the systems because the Tier 2 standard is automatically achieved with functional insulation monitoring. Alongside that, routes are already indicating they prefer to upgrade to RS4 Tier 2 as a bare minimum.



Tony Edwards, Rail Business Manager, Bender UK

Data analysis and trending is also becoming increasingly important and an easy way to access current data is via the cloud using Tier 2 equipment. Bender can enable cloud access as part of its managed service package, which means customers can access data uploaded every 15 minutes from each feeder.”

The RS4 Tier 2 system measures insulation resistance and leakage capacitances to individual feeder levels on rail IT electrical systems up to 690V, in addition to delivering the overall system resistance and capacitance provided by the RS4 Tier 3 system.

Comprehensive data readings and information on the status of miles of networked cables enable operators to make a clearer overall assessment of the system condition and plan predictive and preventive maintenance to prevent downtime.

RS4 Tier 2 is the most cost-effective solution for upgrading previous generation Bender rail technology and can be installed with simple mechanical and wiring modifications onsite. Tier 2 compliance is achieved through the incorporation of Bender Type B current transformers (CT) and the Bender COM465IP condition monitor to enable complex individual feeder measurements. It is also fully upgradeable to deliver a Tier 1 solution.



Bender also offers a range of support systems and services, including remote condition monitoring designed to integrate seamlessly with future smart infrastructure, and advanced analysis of data collected by Bender and third-party devices. This supports end users with the identification of warnings and trends to help minimise failures, improve the efficiency of rail network maintenance, enhance safety and reduce operating costs for the network.

Condition monitoring data from Tier 3 systems is reported back to the Network Rail central system known as RADAR. This is monitored 24/7 by intelligent infrastructure technicians who utilise the information to predict an asset failure, providing guidance to frontline teams.

RS4 Tier 1 increases the functionality level to provide accurate individual cable section and FSP switchgear level insulation resistances. RS4 is an approved Tier 1 solution that doesn't require trackside connection to 650V for safer and more cost-effective installation without the need to switch off power. Bender's Tier 1 solution is capable of separately reporting on the insulation status and performance of the switchgear and cable.

This unique solution enables unobtrusive working with dual end fed reconfigurable systems, so that in the reconfigured state, monitoring can be changed to match the new systems without trackside intervention.

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