

Ref:	NR/L2/SIGELP/50000
Issue:	01
Date:	06/06/2015
Compliance date:	06/06/2016

Level 2

Working on or near 650V Signalling Power Supplies

Endorsement and Authorisation

Endorsed by:



Kyle Windsor, Principal Engineer (ES)



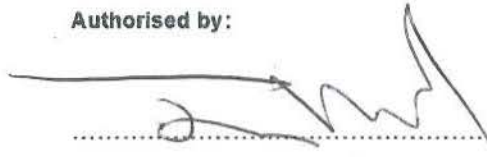
Mark Twigg, Senior Engineer (CCS)

Authorised by:



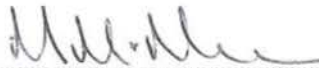
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User information

This Network Rail standard contains colour-coding according to the following Red–Amber–Green classification.

Red requirements – No deviations, could stop the railway

- **Red requirements shall** always be complied with and achieved.
- Red requirements shall be presented in a red box **with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of red requirements lies with the Professional Head/Standard Owner.
- Red requirements are monitored for compliance.
- Corrective actions shall be enforced if deviations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Amber requirements – Controlled deviations, approved risk analysis and mitigation

- **Amber requirements shall** be complied with unless deviation has been approved in advance.
- Amber requirements shall be presented with an amber sidebar **and with the word “shall” or expressed as a direct instruction**.
- Accountability for the efficacy of these requirements lies with the Professional Head/Standard Owner, or their nominated Delegated Authority.
- Amber requirements are monitored for compliance.
- Deviations **may** be permitted. Deviations are approved by the Standard Owner or through existing Delegated Authority arrangements.
- Corrective actions shall be enforced if **non-approved** deviations are discovered through functional checks (e.g. engineering verification visits, audit or Operations Self-Assurance).

Green – Guidance

- Guidance is based on good practice. Guidance represents supporting information to help achieve **Red** and **Amber** requirements.
- Guidance shall be presented with a dotted green sidebar **and with the word “should” (usually in notes) or as a direct instruction**.
- Guidance is **not mandatory** and is not monitored for compliance.
- Alternative solutions may be used. Alternative solutions do not need to be formally approved.
- Decisions made by a competent person to use alternative solutions should be backed up by appropriate evidence or documentation.

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Issue record

Issue	Date	Comments
01	June 2015	Formal first issue.

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 6th June 2016

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

Reference documentation

NR/L2/ELP/27238	Maintenance Specification for Fixed Plant Equipment
NR/L3/SIG/10663	Signal Maintenance Specifications (SMS)
HSG85	Electricity at Work – Safe Working Practices (3 rd Edition)
NR/L3/SIGELP/50001	Working on or near 650V Signalling Power Supplies (Work Instructions)
NR/L2/TEL/30069	Inspection and Minor Maintenance of Lineside S&T Cable Routes
BS7671	17 th Edition Wiring Regulations

Disclaimer

In issuing this document for its stated purpose, Network Rail makes no warranties, express or implied, that compliance with all or any documents it issues is sufficient on its own to ensure safe systems of work or operation. Users are reminded of their own duties under health and safety legislation.

Supply

Copies of documents are available electronically, within Network Rail's organisation. Hard copies of this document may be available to Network Rail people on request to the relevant controlled publication distributor.

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1 Purpose

This standard forms part of an overall maintenance specification for working on or near 650V signalling power supplies on Network Rail managed Infrastructure, and includes:

- Safe working practices.
- Maintenance and testing requirements.
- Active fault and defect management.
- Ellipse requirements.

2 Scope

This standard specifies the maintenance / defect regime for 650V signalling power supply equipment on Network Rail managed Infrastructure which includes:

- 650V Signalling Power supply equipment in equipment housings including FSPs, location cases, relay rooms, REBs, etc.
- 650V Signalling Power supply cabling and cable routes.
- Insulation Monitoring equipment on 650V signalling power supplies.
- 650V Interrupter cabling.

The safety series work instructions specified in this standard covers all disciplines who tasks involve work on or near signalling power supply equipment above 175V, including:

- Network Operations.
- Safety, Technical & Engineering / Digital Rail.
- Infrastructure Projects.
- Network Rail Telecoms.

Note: It is the intention that future updates of this standard and the work instructions will cover all signalling power supply systems above 175V.

3 Abbreviations and Definitions

ACB	Air Circuit Breaker
CPC	Circuit Protective Conductor
EGI	Equipment Group Identifier (Ellipse)
EPR	Electronic Protection Relay
FSP	Functional Supply Point (equipment housing containing 650V signalling power supply equipment)
IME	Infrastructure Maintenance Engineer

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IR	Insulation Resistance
IT	Isolated Terra
MST	Maintenance Scheduled task (Ellipse)
PSP	Principal Supply Point
RAM (E&P)	Route Asset Manager (Electrification & Plant)
REB	Relocatable Equipment Building
SPS	Signalling Power Supplies
WI	Work Instruction

4 Description of the System

In a typical 650V a.c. electrical distribution system used for railway signalling power supplies, an IT system is used. This electrical system has no connection to earth on the secondary winding of the supply transformer at the PSP and is considered an 'earth free' system. This means that a single earth fault on a conductor will not cause the supply to be disconnected under the electrical protection due to no earth path back to source and no fault current flowing. Due to the capacitive effect of the cabling however, there is a small earth leakage current that flows under first fault conditions. The FSP earthing system should be able to limit the touch potential voltage to less than 60V under these conditions. Under a second fault condition (an earth fault on both cores occurring) a fault current will flow, the magnitude of which will depend upon the resistance of the faults to earth. This in turn may result in dangerous touch potential voltages being present at FSPs if there are inadequate or missing FSP earthing systems.

The 650V signalling power distribution, being an earth free system needs continuous monitoring of the insulation in order to identify a first earth fault and to comply with BS7671. This is to allow indication and rectification of an earth fault before the occurrence of a second earth fault which may result in immediate danger to personnel. Insulation monitoring equipment must be employed at PSPs and whenever a 650V booster transformer is employed in a signalling supply feeder.