



Network Rail
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Network Rail Safety Bulletin

Access to Signalling Power Systems Operating Between 175 V ac and 650 V ac

For the attention of all staff and contractors working with signalling power supply systems

This Safety Bulletin is produced in conjunction with the Electricity at Work Regulations 1989.

This Safety Bulletin does not apply to equipment housings that have been

- certified as complying with BS 7671 "Requirements for Electrical Installations" (The IET Wiring Regulations) or
- made dead before work commences.

Its purpose is to identify and control the electrical safety risk from signalling power supply systems operating at or above the nominal voltage of 175 V as distinct from signalling control systems which operate with a nominal voltage of less than 175 V. This includes Location Cases, Supply Terminal Pillars, Functional Supply Points (FSP) and Relay Rooms, herein all referred to as FSPs. In general, FSPs will be of metallic construction but also included are those of wooden or GRP construction.

It is important to note that the maximum safe voltage for working live is 60 V ac and 120 V dc.

In this Safety Bulletin, the word "conductor" refers to both conductors that are designed to be live during normal conditions and those which could become live under fault conditions. A conductor under fault conditions includes any external or internal metalwork associated with the FSP.

All staff should

- avoid making contact with FSPs that could contain signalling power supply equipment operating at a voltage greater than 60V and
- report all electric shocks to the Network Rail Safety Management Information System (SMIS).

The relevant electrical safety and lifesaving rules are:-



Work should be carried out with the supply dead, unless it is unreasonable to work dead, and it is reasonable to work live.



Never assume the equipment is safe, always test before touch



Never undertake an activity unless you have been trained, assessed as competent and have the right equipment

1 Introduction

Following a recent incident where a person received an electric shock, the Office of Rail Regulation has investigated Network Rail's compliance with legislation relating to management of risk arising from non-earthed power systems. As a result, an Improvement Notice has been served on Network Rail. This Safety Bulletin informs staff of immediate and reasonably practical actions to be taken to address the requirements of the Improvement Notice.

Live working is not permitted unless it can be shown that;

- it is unreasonable in all the circumstances for it to be dead; **and**
- it is reasonable in all the circumstances for a person to be at work on, or near it while it is live; **and**
- suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.

Work that you can normally carry out on or near a live conductor is shown below in Section 3.

2 Approach and Entry to an FSP

All tests shall be made with a device using fused and insulated test leads and that the testing device itself be tested before and after the testing for voltage. The device may be fitted with a 150 k ohms shunt if required and there is no need to scrape paint away from the point of testing.

Because there is a risk of an electrical fault having taken place, you must, before you touch a Location Case (FSP), test the external metalwork of the cabinet for voltage between it and;

- each metallic structure, for example, hand rail, barrier, signal post, other FSP or OLE support, within a 2 metre touch distance
- the earth immediately adjacent to the FSP

The test to earth can, for example, use a metal plate (as described in BS EN 50122-1, approximately A4 sized and stood on by a person) or where this is unavailable, via the meters test prod connected to earth immediately adjacent to the cabinet.

- If the test above shows a voltage of greater than 60 V, you must now work live. You may open the cabinet door, but you must
 - use insulated gloves as in Section 4 and
 - follow the instructions shown below in Section 5.
- If the test above shows a voltage of less than 60 V then you may open the FSP door without additional precautions.

Once the FSP door has been opened, you must:

- Repeat the voltage test described above but, this time, between all metal covers within the case and:
 - the location case itself
 - each metallic structure, for example hand rail, barrier, signal post, other FSP or OLE support, within a 2 metre touch distance;
 - the earth immediately adjacent to the cabinet.
- Look out for any insulation on a live conductor above 60 V that is damaged or missing for any reason (which includes the originally designed arrangement), which could provide a risk of electric shock. In this context, damaged or missing insulation means that
 - For horizontal surfaces, an access hole greater than 1 mm diameter is present or
 - For all other surfaces, an access hole greater than 12.5 mm diameter is present.

If any voltage measured within the cabinet exceeds 60 V or you are already working on or near a live conductor because the voltage test of the cabinet external metalwork showed above 60 V, or there are exposed live conductors above 60 V, then you must continue working with the precautions for working on or near a live conductor until the task is complete.

If you are not working on or near a live conductor because the equipment is fully insulated or no voltage above 60 V has been measured, you may carry out any task that you are instructed to do without additional precautions unless the work that you are going to do exposes live conductors.

3 Work that is reasonable to carry out on or near a live conductor

You may only carry out any work on or near a live conductor above 60 V if it is permitted under Section 1 and you have been judged to be competent to carry out the specific task without the risk of injury.

4 Precautions for Working On or Near a Live Conductor

When working on or near a live conductor suitable precautions must be taken to prevent injury. These should include at least one of the following precautions during all work on or near a live conductor.

- Insulated gloves in good condition to BS EN 60903 Class 0 (Network Rail part number FBC90VSE), for example when opening a FSP door with greater than 60 V measured.
- Insulated tools in good condition to BS EN 60900 Class 0, for example when working on live conductors
- Insulated mat in good and dry condition to BS EN 61111 Class 0, for example when kneeling in front of a cabinet

- Temporary additional insulated screening to protect against contact with live conductors and/or metalwork.

When working in heavy rain, the use of a portable tent is required.

5 Actions When a Live Cabinet is Found

If a cabinet is found to have a voltage above 60 V then you must

- Report it to fault control on an urgent basis and
- Not leave the cabinet unattended until it has been disconnected or the fault repaired or a suitable exclusion zone around the cabinet has been erected. The preferred option is to repair the electrical fault that has caused the presence of a voltage over 60 V. NOTE Where a faulty cabinet is found in a location which is accessible to the public it must not be left unattended in any circumstances unless it has been made safe by disconnection or repair.

6 Working alone

When working on or near live equipment, you must not work alone.

Further guidance can be found in

- Network Rail Technical Instruction TI 164 - 650/400 V IT Signalling Power Supplies
- NR/L2/10064 - General Instructions to Staff Working on S&T Equipment, Modules E022 and X002.
- NR/GN/ELP/27318 - Insulation Monitoring of 650 V Earth - Free (IT System) Power Cables
- NR/L2/ELP/27238 - Maintenance specification for fixed plant equipment
- NR/L3/RCS0216/DP10 – Working on low voltage equipment
- NR/L3/ELP/27241 “Fixed Plant Work instructions”
- TNC8785 and Management plan
- Route based TNCs

A Guidance Note is available to support this Safety Bulletin

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