

## London Underground 110V Reduced Low Voltage (RLV) Testing Guidance Sheet

### Design and Verification - 110V RLV Systems

The 110V RLV Systems used within London Underground establishments are generally derived from single phase isolating transformers with 2 no. 55V secondary windings, which provide a 110V RLV supply when correctly installed. This arrangement provides 110V line to line and 55V from either line to earth.

Although 110V RLV systems are safer than other Low Voltage Systems they are still subject to the same design and verification (test) requirements of any other electrical circuit. These requirements are detailed within BS 7671:2008 Amendment 3 (17th Edition of IET Wiring Regulations).

### Design - 110V RLV Circuits - Blakley Calculator

Unfortunately most popular electrical design packages do not support 110V RLV systems. Blakley Electrics have therefore developed their Electrical Calculator, which is able to provide secondary source impedance and prospective fault current details at both 55V and 110V. This allows new sources at 55V and 110V to be created within the electrical design package and for the relevant calculations to be performed. Please note that the Blakley Calculator is only intended for guidance and should be used for design purposes only. For further details on the Blakley Calculator please contact the Blakley Project department.

### Verification - 110V RLV Circuits

Due to the reduced 110V and 55V potential to earth of a 110V RLV system many conventional live test instruments are not suitable for performing the verification tests required by BS7671. Below is guidance on the selection of suitable test instruments for conducting Earth Loop Impedance and RCD testing.

#### Earth Loop Impedance Testing

In order to perform an Earth Loop Impedance test on a 110V RLV circuit, a test instrument with a minimum operating voltage of 50V is required. It is preferable that the test set is a 2 wire device, as many 3 wire test sets require the neutral and earth to be at the same potential: such instruments are unsuitable for operation on an RLV supply because the neutral is not distributed (N is replaced by L2).

If the 110V RLV circuit also incorporates RCD protection a low current / no-trip loop tester might be preferred.

The Megger LTW325 tester meets the above requirements and this device, or an equivalent, should be suitable for testing the Earth Loop Impedance on 110V RLV systems.

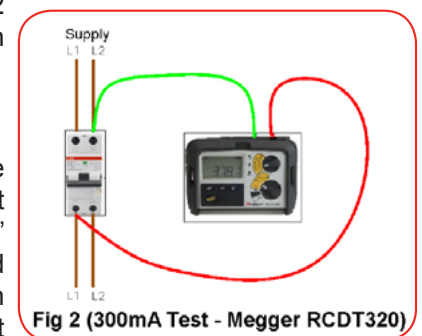
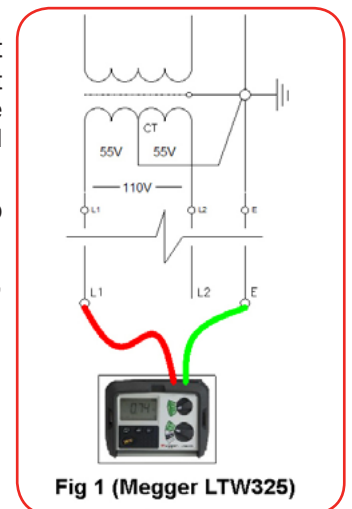
#### RCD Testing

In order to perform an RCD test on a 110V RLV circuit, a test set with a minimum operating voltage of 50V is required. In addition, it is preferable that the test set is a 2 wire device, as many 3 wire test sets require the neutral and earth to be at the same potential: such instruments are unsuitable for operation on an RLV supply because the neutral is not distributed (N is replaced by L2).

The Megger RCDT320 test set can be configured for 2 or 3 wire operation and in 2 wire mode is suitable for testing RCDs on 110V RLV systems. Other instruments with a similar specification may also be suitable.

#### 300mA RCD Testing

Blakley Electrics TDCR and THR ranges of transformer assemblies can incorporate 300mA Selective ("S" or time delayed) RCCBs. In order to successfully perform a test on these 300mA S devices, the RCD test instrument must be configured to test an "S" device. Also the majority of RCD test instruments are unable to generate the required 300mA test current from a 55V source. Therefore the connection method detailed in Fig 2 should be adopted in order to provide a 110V source and ensure the correct test current is applied during the test.



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