

1. SCOPE

This document provides guidance on the approach to be adopted when planning, designing and delivering all LV network solutions including new networks, fault repairs, modernisation, reinforcement and mixed earthing arrangements.

2. ISSUE RECORD

This is a Controlled document. The current version is held on the EN Document Library.

It is your responsibility to ensure you work to the current version.

Issue Date	Issue No.	Author	Amendment Details
March 2009	3	Colin Brown	Issue 2 updated with comments from Legal section & general comments
September 2015	4	Gordon MacKenzie	Issue 3 general revision. Document restructured to support policy application.
September 2018	5	Gordon MacKenzie	General review of Issue 4 pending completion of Neutral Current Diversion project in association with PNDC. Updated text for temporary RCD position section 12.4. Updated reference BS 7671. Updated PME value section 12.4 Guidance removed from section 10.4 combined HV / LV Earthing.

3. ISSUE AUTHORITY

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4. REVIEW

This is a Controlled document and shall be reviewed as dictated by business or legislative change but at a period of no greater than 3 years from the last issue date.

SPEN working in partnership with Strathclyde University and PNDC Network Operators to review the impact of Neutral Current Diversion on existing Networks constructed in compliance with industry guidance ENA ER G12/4. This document shall be subject to further review on completion of the PNDC project works, which will also include a review of LV Foundation Earthing in association with IET.

DISTRIBUTION

This document is part of the Construction Virtual, SPD and SPM System Design Manuals maintained by Document Control but does not have a maintained distribution list. It is also published on the SP Energy Networks website.

provides guidance on the application of Protective Multiple Earthing to an LV network and as such will be referenced extensively within this policy document.

8.3 BS7671 – Requirements for Electrical Installations

BS 7671 Requirements for Electrical Installations otherwise known as the Wiring Regulations sets out the requirements which should be met by a customer’s LV electrical installation in order to ensure safety. Within these requirements are those for the equipotential bonding required between the installation’s earthing conductor and extraneous conductive parts within a customer’s premises.

The use of a new earth terminal by any customer connected to the SPEN LV distribution network is contingent upon their compliance with the equipotential bonding requirements of the wiring regulations at the time their installation is connected to the terminal.

Table 1 – Requirements for equipotential bonding conductors in customer installations
(table 54.8 BS 7671 2018)

Copper Equivalent cross-sectional area of the supply neutral conductor	Minimum copper equivalent cross-sectional area of the main protective bonding conductor
35mm ² or less	10mm ²
Over 35mm ² up to 50mm ²	16mm ²
Over 50mm ² up to 95mm ²	25mm ²
Over 95mm ² up to 150mm ²	35mm ²
Over 150mm ²	50mm ²

Equipotential bonding is required between the earth conductor and the following extraneous conductive parts:

- Water installation pipes
- Gas installation pipes
- Other installations pipework and ducting
- Central heating and air condition systems
- Exposed metallic structural parts of the building

8.4 Types of Network and Service Connection

There are typically four basic kinds of LV service connection which can be found on the SPEN LV networks.

8.4.1 TN-C-S

TN-C-S connections are associated with networks comprising combined neutral earth cables where the neutral and earth functions are combined in a single conductor. This type of cable is used in the construction of all new Protective Multiple Earthing (PME) networks and such a supply is often referred to as a PME supply.

PME is not necessarily defined by the type of cable used or limited to a specific type of cable rather by the fact that the neutral conductor, which may or may not also be the only earth conductor in the cable, is connected to earth at multiple points within the network. A feeder constructed using a Combined Neutral Earth cable must comply with the requirements of PME regulations in the ESQCR as described above, whereas a feeder comprising separate neutral and earth conductors need not comply with the requirements to earth the neutral at more than one location beyond the voltage source.

Figure 1 (reproduced with permission from ENA Engineering Recommendation G12/4) illustrates where PME facilities may be provided in the case of hybrid networks where a mixture of SNE and CNE cables have been installed over time.