

Ref:	NR/L2/SIGELP/27418/MOD A
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Level 2

Design, Installation and Testing of Earthing in Signalling Power Systems

Module A Earth Electrode Installation Process

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1 Purpose

This module sets out a typical process for the installation of earth electrodes for the purpose of achieving a safety earthing system. This shall be read in conjunction with the parent standard NR/L2/SIGELP/27148 and used with respect to the risk assessment derived for any specific installation or site.

2 Earth electrode installation process

The following sequence should be followed for an earth electrode installation.

EE1. Select a preferred location for the first electrode, taking into account the following:

- In d.c. electrified areas, it should be at least 3 m away from running rail and d.c. traction return equipment;
- Consider the presence of any buried services, cables, OLE, troughing or external cable routes (as determined by the designer's risk assessment and site inspection or survey detailed in Section 5 of NR/L2/SIGELP/27418);
- The first electrode shall be as close as possible to the apparatus housing to be earthed, ideally within 1 m.

EE2. Before starting to install any electrodes, scan the area around the intended position of the first electrode to a radius of 2.5 m with a radio detection unit (RDU) scanner, approved for the purpose by NR, to confirm the cable routes and map any other buried services such as legacy cables, pipes etc. **Module E** (NR/L2/SIGELP/27418/MOD E) provides advice on the selection of an appropriate scanner.

EE3. Confirm the intended position for the first electrode and mark out.

EE4. To improve the effectiveness of the RDU scan, scan the intended position again and hand-dig a pit in incremental levels (nominally 30 cm) until 1 m depth is achieved, repeating the RDU scan at each level and again at the bottom of the 1 m pit.

NOTE: Shoring up, shuttering, sloped wall or benching may be used to prevent the risk of collapse during digging. The actual method will depend on site conditions.

EE5. If there remains any uncertainty about whether buried services might be present, backfill the pit, select an alternative electrode position and repeat the scanning process.

EE6. If the results of the scan are clear, electrode installation can commence.

EE7. Initially use one section of earth rod for the first electrode.

EE8. Fit the electrode with a threaded coupling and driving stud.

NOTE: The stud protects the end of the electrode during driving.

EE9. Do not drive electrodes into the ground with a sledgehammer.

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EE10. Drive electrodes into the ground vertically using a petrol-driven tamper, or equivalent, fitted with the correct adaptor for studs. Take care to check that the driving is as near vertical as possible. An A-frame piling structure can be used to support the tamper while driving.



Figure 1 – Typical copper-bonded earth electrode with coupling and driving stud

- EE11. Having driven the first earth rod of the first electrode such that the top of the rod is at approximately ground level (the rod having only been driven in 20 cm below the base of the pit), remove the driving stud, connect a second rod and tighten it. Fit a coupler to the top of the second rod and, if in good condition, reuse the driving stud. Continue to drive the electrode until the top is approximately at ground level.
- EE12. Measure the earth electrode resistance in accordance with Section 9 of NR/L2/SIGELP/27418. If the electrode has attained the desired value, drive the electrode further to a depth just below ground level to allow for fitment of an earth electrode inspection pit. The electrode is then ready for finishing off .
- EE13. If the electrode earth resistance is still greater than the maximum permissible earth resistance value, and the geological survey (Section 5.8.1 of NR/L2/SIGELP/27418) suggests that driving to more than 3 m depth is unlikely to result in encountering obstructions (such as rock), remove the driving stud, connect a third earth rod and tighten. Fit a coupler to the top of