Earthing & Bonding Technical Document

Revision 1/0705/LF

Background

The aim of this technical document is to provide important and legal information on the earthing and bonding of communication cabinets, frames and racks as used in both the data and telecommunications market place.

This information is drawn from current BS 7671 (IEE 16th Edition Electrical Regulations), BS 6701: 2004, BS EN 501310 & BS EN 50174.

Terminology

AWG	American Wide Gauge
FE	Functional Earth
PE	Protective Earth
CMET	Customer Main Earth Terminal
Cabinets	Communication Cabinets, Frames & Racks

Scope

1. An approved earth connection ***is not*** supplied by a three pin mains (240v) plug.

2. An approved earth connection ***is not*** supplied by the use of a steel wired armoured cable.

3. For small mounted wall cabinets the FE/PE connection ***must be*** at least twice the size of the phase conductor. If the size of the phase conductor is 1.5mm, then the FE/PE connection shall as a minimum requirement is 4mm in size. This size is based on no active equipment being installed within the cabinet.

4. For larger floor mounted cabinets, the minimum size of the FE/PE conductor ***must be*** no smaller than 16mm in size. This size is based on no active equipment being installed within the cabinet.

5. Each cabinet ***shall*** have its own individual FE/PE conductor.

6. Bayed cabinets ***shall*** each have their own individual FE/PE conductor.

7. Earthed patch panels ***must not*** be daisy chained together.

8. STP patch panels ***shall be*** connected to the cabinet using separate 1.5mm FE/PE cables.

9. The FE/PE conductor ***shall be*** in the first instance connected directly back to the CMET or to a nearby approved earth.

10. In the case of a communications room, not having a direct connection back to the CMET, an earth busbar ***shall be*** installed. The busbar must be manufactured as a pre-drilled copper unit and at least 6mm thick, 100mm wide and 200mm in length. It is essential that the busbar be suitable for immediate use, although 30% expansion should be allowed for future system growth.

11. The location of the busbar shall be such that it easily accessible.

12. FE/PE cables ***must be*** kept short and as straight as possible to avoid creating high impedance.

13. FE/PE cables ***shall not*** be coiled or double back on themselves as this would create a parallel path.

14. FE/PE cables can be connected back to the CMET or approved earth along with all other services.

15. In the cases of all communication cabinets where active equipment is to be installed, the overall watts/power/amp output level must be determined to ***ensure*** that the correct size FE/PE cable is installed prior to the system going live for the client to use. The system ***may be tested*** without the correct FE/PE cable being in place.

16. The American National Standards Institute and the UK Electrical Contractors Association are now detailing the following sizes for FE/PE cables, although these figures should only be applied to large data communication rooms with large amounts of active equipment.

Distance from CMET (metres)	FE/PE cable Size (AWG)	FE/PE cable Size (mm)
4	6	16mm +
6	4	21mm +
8	3	26mm +
10	2	33mm +
13	1	53mm +
16	1/0	42mm +
20	2/0	74mm +
>20	3/0	86mm +