

SSE Power Distribution	SPECIFICATION FOR BONDING AND EARTHING DURING THE INSTALLATION OF NEW CONNECTIONS	Page 1 of 5
Applies to Third party installers of new connections		SP-PS-312
Prepared by: JB, Network Services		Rev: 2.01
Authorised by: AB, Network Services Manager	Proposed Review Date: Mar 2012	Issue Date: Mar 2007
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INFORMATION PROVIDED TO ASSIST THE INSTALLER OF NEW CONNECTION:

**BONDING AND EARTHING DURING THE INSTALLATION OF NEW
CONNECTIONS**

ITEM:

REFERRED TO IN EACH:

**HARMONISATION DOCUMENT/
EUROPEAN STANDARD**

I.E.C.

BRITISH STANDARD

BS 6004, 6651, 7430

**ENERGY NETWORKS ASSOCIATION
TECHNICAL SPECIFICATIONS**

**TS 41-24
ER G 12/3**

DEROGATIONS (IF ANY)

<p align="center">SSE Power Distribution</p>	<p align="center">SPECIFICATION FOR BONDING AND EARTHING DURING THE INSTALLATION OF NEW CONNECTIONS</p>	<p align="center">Page 2 of 5</p>
<p>Applies to Third party installers of new connections</p>		<p align="center">SP-PS-312</p>
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1 INTRODUCTION

This document provides guidance to third parties installing lines, cables and substations in SSE Power Distribution (SSEPD) territory, on the bonding and earthing standards/specifications to be adopted when designing and constructing earthing layouts operating at voltages up to and including 11kV.

2 DESIGN

2.1 General

The earthing of distribution systems and the bonding and earthing of metal work enclosing or supporting electrical apparatus, installed in SSEPD territory, shall comply with the appropriate requirements of the following, unless amended by this document:

- a) Electricity, Safety, Quality and Continuity Regulations 2002.
- b) Electricity at Work Regulations 1989.
- c) Energy Networks Association Technical Specification 41-24: Guidelines for the Design, Installation, Testing and Maintenance of Main Earthing Systems in Substations.
- d) Energy Networks Association Engineering Recommendation G 12/3: Requirements for the Application of PME to Low Voltage Networks.
- e) BS 7430: Code of Practice for Earthing.
- f) BS 6651: Protection of Structures Against Lightning.
- g) BS 6004: PVC insulated cables (non-armoured) for electric power and lighting.

2.2 Survey & Design

The basic requirements for carrying out an earthing survey and the design of earth electrode systems are specified in BS 7430.

2.3 Pre-Construction documents

Two copies of the Earthing Survey Document shall be to provided, by the third party, for approval by SSEPD. This document shall comprise:

- a) System diagram showing the position of all electrode Systems
- b) Earthing schedule detailing;

SSE Power Distribution	SPECIFICATION FOR BONDING AND EARTHING DURING THE INSTALLATION OF NEW CONNECTIONS	Page 3 of 5
Applies to Third party installers of new connections		SP-PS-312
Prepared by: JB, Network Services		Rev: 2.01

- i) measured value of soil resistivity at each location.
- ii) type of earth electrode system.
- iii) specification for each earth electrode system.
- iv) maximum value of resistance to earth of each electrode system.

2.4 Final Records

As specified for line, cable and substation standards.

The installed earth resistance values measured at each electrode systems shall be recorded on the Earthing schedule.

3 MATERIALS

- 3.1 Bonding conductors, earth leads, separate earth conductors and buried horizontal electrodes shall be copper.
- 3.2 Where covered earth conductors/earth leads are specified the covering shall be black PVC and comply with BS 6004.

4 LOW VOLTAGE DISTRIBUTORS

4.1 Combined Neutral and Earth Distributors (CNE, TN-C-S)

SSEPD's current policy is that where the appropriate Regulations are met, and the properties are suitable for the application of PME, the distributor and services shall be multiple earthed and a PME earthing terminal provided at each service termination.

- 4.2 However for steel framed buildings PME will only be provided in situations where one customer is to be connected. Where more than one customer is being connected or where there is a likelihood of a building being split into multiple units then Separate Neutral and Earth (SNE) will be provided. (See SSEPD document TG-PS-072).

SSE Power Distribution	SPECIFICATION FOR BONDING AND EARTHING DURING THE INSTALLATION OF NEW CONNECTIONS	Page 4 of 5
Applies to Third party installers of new connections		SP-PS-312
Prepared by: JB, Network Services		Rev: 2.01

4.3 Separate Neutral and Earth Distributors (SNE, TN-S)

Where properties are unsuitable for the application of PME and/or the electrical installations do not comply with the Regulations, the distributor and services shall be of SNE type and separate earth terminal provided at each service termination. The neutral shall be earthed at the source substation only (SEN).

The separate earth conductor shall provide a continuous path back to the source substation and have a current carrying capacity not less than one half that of the phase conductor; and must in any case be not less than 16 mm².

4.4 Protective Neutral Bonding (PNB, TN-C-S (PNB))

PNB is not a current standard or use on SSEPD systems.

5 11KV DISTRIBUTORS

5.1 Overhead Lines

All supporting metalwork attached to, or forming part of, a wood pole structure shall be bonded together but shall not be earthed unless the lowest member is less than 3 metres above ground level; or is supporting a transformer, metal rod operated equipment, cable termination, surge arresters or other equipment required to be earthed. Bonding conductors shall have a minimum cross sectional area of 19 mm² for line conductors up to 32 mm² and 32 mm² for line conductors greater than 32 mm².

Earth electrode systems associated with supporting metalwork/plant shall have a resistance to earth not exceeding 50 Ω or 10 Ω where surge arresters are installed. Such Systems shall be electrically separated from low voltage earth electrode systems and switchgear earth mats by a distance of at least 3 metres. Each earth lead shall be insulated and have a cross sectional area of 35 mm², or 70 mm² where surge arresters are installed and the line conductors exceed 32 mm².

All earth conductors shall be pvc covered and comply with BS 6004.

5.2 Underground Cables

The metallic screens/armours of three core cables and single core cables laid in close trefoil formation shall be bonded to the high voltage metalwork earth at each termination.

<p align="center">SSE Power Distribution</p>	<p align="center">SPECIFICATION FOR BONDING AND EARTHING DURING THE INSTALLATION OF NEW CONNECTIONS</p>	<p align="center">Page 5 of 5</p>
<p>Applies to Third party installers of new connections</p>		<p align="center">SP-PS-312</p>
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6 SUBSTATIONS

6.1 Plant/Metalwork

The plant metal and metallic screens of high voltage cables shall be connected to a common earth electrode system that has a resistance to earth not exceeding 50 Ω . The earth leads shall have a minimum cross sectional area of 35 mm² for pole mounted, or 70 mm² for ground mounted plant respectively.

6.2 Low Voltage Neutral

The low voltage neutral shall be connected to an earth electrode system that is electrically separated from other systems. It shall have a resistance to earth not exceeding 40 Ω and an overall resistance of 20 Ω when PME earthing facilities are provided. The earth leads shall be insulated and have a minimum cross sectional area of 35 mm² for pole mounted, or 70 mm² for ground mounted plant respectively.

For further information regarding ground mounted substations refer to SSEPD document SP-PS-315.

7 APPLICABLE STANDARDS

- 7.1 Third Parties must obtain copies of non SSEPD Standards from the issuing organisations at their own expense. These documents may be subject to copyright.
- 7.2 Third Parties will obtain copies of SSEPD Standards or other SSEPD documents from the SSEPD Power Systems Document Administrator, Inveralmond House, 200 Dunkeld Road, Perth PH1 3AQ.
- 7.3 There will be a cost of £50 for each document requested to cover administration and copying costs.

Note SSEPD cannot provide copies of BS, IEC or ENA documents.