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STATUTORY INSTRUMENTS

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**1988 No. 1057**

**The Electricity Supply Regulations 1988**

**PART II**

**CONNECTION WITH EARTH**

**Continuity of the supply neutral conductor and earthing connections**

4.—(1) The supplier shall, in the design, construction, maintenance and operation of his system, take all reasonable precautions to ensure continuity of the supply neutral conductor.

(2) Except as required by any arrangements made pursuant to regulation 26, no fuse or automatic switching device shall be inserted in any supply neutral conductor.

**General requirements for connection with earth**

5.—(1) The supplier shall, in respect of his works, ensure that—

(a) every high voltage system shall be connected with earth at or as near as is reasonably practicable to the source of voltage in the System:

Provided that where there is more than one source of voltage in the System the connection with earth need only be made at one such point;

(b) every low voltage supply system shall be connected with earth in accordance with paragraphs (2), (3) and (4);

(c) so far as is reasonably practicable, no system shall become disconnected from earth in the event of a fault;

(d) no conductors which respectively connect a supply neutral conductor with earth, and any apparatus used in a high voltage system with earth—

(i) shall be interconnected unless the combined resistance to earth does not exceed 1 ohm; or,

(ii) shall be connected to separate earth electrodes unless any overlap between the resistance areas of those electrodes is not sufficient to cause danger;

and

(e) where the high voltage System is connected with earth through a continuously rated arc Suppression coil, an automatic warning shall be given to the supplier of any fault which causes the arc suppression coil to operate.

(2) The supply neutral conductor shall be connected with earth at or as near as is reasonably practicable to the source of voltage and, subject to regulations 6 and 7, no other such connection shall be made:

Provided that where only one consumer is connected to the source of voltage that connection may be at some other point.

(3) Except as required by any arrangements made pursuant to regulation 26, no impedance shall be inserted in any connection with earth of a low voltage system other than that required for the operation of switching devices, instruments, control or telemetering equipment.

(4) The external conductor of any electric line comprising concentric conductors shall be connected with earth.

### **Multiple earthing**

6. The supplier may connect the supply neutral conductor of a distributing main with earth at places in addition to that required by regulation 5(2) if, and only if, the copper equivalent cross-sectional area of the supply neutral conductor—

- (a) when measured anywhere in a three-phase four wire, two-phase three wire or single-phase three wire distributing main is not less than one half of the copper equivalent cross-sectional area of the phase conductor at the same point; or
- (b) when measured anywhere in a single-phase two wire distributing main is not less than the copper equivalent cross-sectional area of the phase conductor at the same point,

and in either case is such that it is capable of carrying such loads as may reasonably be expected to occur.

### **Protective multiple earthing**

7.—(1) The supplier shall not connect or permit the connection of, or continue, a supply to any part of a consumer's installation where the supply neutral conductor is, or is intended to be, used to connect any circuit protective conductor in that part of the consumer's installation with earth unless he is satisfied so far as is reasonably practicable, that—

- (a) his works comply with the requirements of paragraphs (2) or (3) and paragraphs (4) to (6); and
  - (b) the consumer's installation complies with the requirements of paragraphs (7) to (10).
- (a) (2) (a) For the purposes of this paragraph and paragraph (3)—
- (i) measurements shall, where appropriate, be made along the distributing main;
  - (ii) in a distributing main which is divided so that it has more than one end, apart from that at the source of voltage, each such end shall be treated as if it were the only end of that main.
- (b) The supply neutral conductor shall be connected with earth at a point no nearer to the source of voltage than the junction of the distributing main with the service line connecting it with the consumer's installation which both uses the supply neutral conductor as its connection with earth and is the nearest such installation to the end of the distributing main.
- (a) (3) (a) This paragraph applies only where—
- (i) at least one of the consumer's installations (not exceeding four in total) whose connections to a distributing main lie nearest to the end of the main uses the supply neutral conductor for the purpose of connecting the installation with earth; and
  - (ii) the distance of the furthest of those connections from the end of the distributing main does not exceed 40 metres.
- (b) In any case where this paragraph applies the supply neutral conductor shall be connected with earth at a point no nearer to the source of voltage than the junction between the distributing main and the service line connecting the consumer's installation referred to in sub-paragraph (a) above which is nearest to the source of voltage in the distributing main.

(4) The supply neutral conductor shall be connected with earth at such points as may be necessary to ensure that the resistance to earth of the supply neutral conductor—

- (a) does not anywhere exceed 20 ohms; and
- (b) is such that the fuses or automatic switching devices protecting the high voltage side of any transformer will operate if any fault in it causes the low voltage side to become charged at a higher voltage unless the high voltage side of that transformer is connected with earth through a continuously rated arc suppression coil.

(5) The supply neutral conductor shall have a copper equivalent cross-sectional area which satisfies the requirements of regulation 6.

(6) Any connection with earth required by this regulation may be made by connecting the supply neutral conductor to the supply neutral conductor of another distributing main.

(7) Any metalwork on the consumer's premises which—

- (a) is in, or may reasonably be expected to come into electrical contact with earth;

and

- (b) is so situated that any person, livestock or domestic animal could simultaneously touch—
  - (i) any such metalwork, or any metalwork in electrical contact therewith; and
  - (ii) any exposed metalwork forming part of the consumer's installation but not normally carrying an electric current, or any metalwork in electrical contact therewith,

shall be connected to the earthing terminal.

(8) Where paragraph (7) applies—

- (a) every circuit protective conductor in the part of the consumer's installation described in paragraph (1) shall be connected to the earthing terminal mentioned in paragraph (7);
- (b) the connection required by paragraph (7) shall be made by means of a bonding conductor attached in such a way as to avoid, so far as is reasonably practicable, electrolytic action at the point of connection; and
- (c) where the bonding conductor is attached to a pipe or metalwork entering a building or Structure that connection shall be made as near to the point of entry as is reasonably practicable for the purpose of avoiding the risk of electric shock.

(9) The minimum copper equivalent cross-sectional area of any bonding conductor shall not be less than the figure shown in column 2 of the Table set out below in respect of any supply neutral conductor the corresponding copper equivalent cross-sectional area of which is shown in column 1.

Table

Column 1 <i>Copper equivalent cross-sectional area of supply neutral conductor</i>	Column 2 <i>Minimum copper equivalent cross-sectional area of bonding conductor</i>
35 sq mm or less	10 sq mm
over 35 sq mm but not more than 50 sq mm	16 sq mm
over 50 sq mm but not more than 95 sq mm	25 sq mm
over 95 sq mm but not more than 150 sq mm	35 sq mm
over 150 sq mm	50 sq mm

(10) The supply neutral conductor shall not be connected electrically to any metalwork in any caravan or boat.

### **Earthing of metalwork**

**8.—(1)** Subject to paragraph (2), and without prejudice to any other requirement as to earthing, any metalwork enclosing, supporting or otherwise associated with a supplier's works and which is not intended to serve as a phase conductor shall, where necessary to prevent danger, be connected with earth.

(2) Paragraph (1) shall not apply—

- (a) to any metalwork attached to, or forming part of, a wooden pole support the design and construction of which are such as to prevent, so far as is reasonably practicable, danger within three metres of the ground from any failure of insulation; or
- (b) to any wall-mounted metal bracket carrying an overhead line not connected with earth where the line is both supported by an insulator and the part of the line in contact with the insulator is itself surrounded by insulation.