

Guide to

Electrical earth monitoring and protective conductor proving

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- British Lawn Mower Manufacturers' Federation
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- Department of Trade and Industry (Consumer Safety Unit, C A Division)
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- Electricity Supply Industry in England and Wales
- Electronic Components Industry Federation
- Health and Safety Executive
- Institution of Electrical Engineers
- National Inspection Council for Electrical Installation Contracting
- Portable Electric Tool Manufacturers' Association

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Foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee. It supersedes BS 4444:1969 which is withdrawn.

This standard has been revised to take account of the latest developments in the field of electrical earth monitoring.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

The possibility of damage to, disconnection from, or a rise in impedance of, any protective conductor, cannot be eliminated by periodic inspection and, in any event, accidental damage could occur between inspections. For example, trailing cables supplying portable or transportable equipment such as conveyors, pumps and generators, are particularly vulnerable to faults in the protective conductor due to mechanical damage or excessive strain.

Earth monitoring may be applied in certain special applications in fixed installations where the integrity of the protective conductor is vital to the safety of the system and where protective conductors are particularly vulnerable.

Earth monitoring devices are intended to maintain a continuous check on the integrity of the protective earth conductor. They do not of themselves ensure protection against earth fault currents which would normally be provided by overcurrent protective devices or by some forms of earth fault circuit breaker.

If the earth connection is severed or deteriorates and if the appliance or equipment develops an earth fault then the overcurrent protective device used to give protection against indirect contact will not operate and the user may receive an electrical shock which, if not fatal in itself, may cause a fall from a height or against moving machinery.

The various devices covered by this guide provide methods of checking the integrity of the earth connections and establish whether the earth return paths are in a healthy state to carry earth fault currents. High resistance earth fault currents due to insulation deterioration are not normally detected by overcurrent protective devices such as fuses and miniature circuit breakers. In these cases a residual current device should be used in conjunction with the earth monitoring or proving device to provide protection.

1 Scope

This British Standard explains the principles involved in the design and construction of earth monitoring, earth proving and insulation monitoring devices, together with the requirements for their safe use and application.

Systems of earth fault protection are given in Appendix A and special requirements for protection of data processing equipment are described in Appendix B.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard the following definitions apply.

2.1

earth proving system

a system for providing a means of maintaining a high degree of confidence in the continuity of a protective conductor within the installation

2.2

earth monitoring system

a system for providing a means of maintaining a high degree of confidence in the measured impedance of a protective conductor forming part of the earthing arrangements of an electrical system

2.3

functional earthing system

a system of earthing provided in an installation where earth currents flow due to the normal function of load apparatus

NOTE This system is additional to the protective earthing arrangements.

2.4

residual current protection system

a system for providing a means of detecting and interrupting the supply in the event of unintentional residual currents flowing and thereby giving additional protection against dangerous electric shock and fire hazards caused by the flow of such currents

NOTE These residual currents are usually much smaller than those required to blow a fuse or trip a circuit breaker.

2.5

voltage operated earth fault system

a system which uses a voltage sensing device and is designed to minimize the risk of dangerous electric shock by interrupting the supply if the apparatus casing reaches a potential substantially different from that of its surroundings

NOTE A.C. voltage-operated earth leakage circuit breakers are specified in BS 842.

2.6

earth leakage current

a current which flows to earth, or to extraneous conductive parts, in a circuit which is electrically sound

NOTE This current may have a capacitive component including that resulting from the deliberate use of capacitors.

2.7

fault current

a current resulting from an insulation failure or the bridging of insulation