Australian Standard®

ELECTRICAL EQUIPMENT FOR COAL AND SHALE MINES—ELECTRICAL PROTECTION DEVICES

Part 1—GENERAL REQUIREMENTS

This Australian Standard was prepared by Committee EL/23, Electrical Equipment in Coal Mines. It was approved on behalf of the Council of the Standards Association of Australia on 15 March 1988 and published on 17 June 1988.

The following interests are represented on Committee EL/23:

Australian Coal Association
Australian Electrical and Electronic Manufacturers Association
Confederation of Australian Industry
Department of Industrial Relations and Employment, N.S.W.
Department of Mines, Qld.
Joint Coal Board
Institution of Mining Electrical and Mining Mechanical Engineers
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PREFACE

This Standard was prepared by the Association's Committee on Electrical Equipment in Coal Mines. It is one of a series of five Standards which collectively supersede AS 2081—1977, *Earth-fault protection, monitoring and current limitation equipment for use in coal and shale mines.*

This series of Standards is as follows:

AS
2081 *Electrical equipment for coal and shale mines—Electrical protection devices*
- Part 1: *General requirements* (AS 2081.1)
- Part 2: *Earth-continuity monitoring devices* (AS 2081.2)
- Part 3: *Earth-leakage protection devices for use on systems incorporating earth-fault current limiters* (AS 2081.3)
- Part 4: *Lockout earth-fault protection devices* (AS 2081.4)
- Part 5: *Earth-fault current limiters* (AS 2081.5)

The following are the major changes in this edition:

(a) Former definitions have been amended and new definitions added.
(b) Former requirements for relays have been amended to require a minimum degree of protection of IP53.
(c) Reference to AS 1829 has been replaced by reference to AS 2380.7.
(d) Where appropriate, the provisions of AS 3108.1 and AS 3126 have been called up.
(e) Requirements for protection against false operation of earth-continuity monitoring devices and earth-leakage protection devices have been included.
(f) The operating value test has been amended.

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ELECTRICAL EQUIPMENT FOR COAL AND SHALE MINES—ELECTRICAL PROTECTION DEVICES

PART 1: GENERAL REQUIREMENTS

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard applies to equipment for current-operated earth-leakage protection, lockout earth-fault protection, earth-continuity protection and earth-fault current limiting for use in coal and shale mines.

It is limited to electrical systems supplying equipment above and below ground. It includes requirements for elements that detect the faulty condition, equipment for initiating tripping or locking-out of circuit interrupting devices, and equipment for limitation of earth-fault currents.

It does not include requirements for circuit interrupting devices or sensitive earth-fault protection devices of the type used for portable hand-held tools as these requirements are set out in other Australian Standards.

Information on the general principles of earth-leakage protection, lockout earth-fault protection, earth-continuity protection, and earth-fault current limitation is given in Appendix A.

1.2 REFERENCED DOCUMENTS. The documents below are referred to in this Standard.

AS

1939 Classification of degrees of protection provided by enclosures for electrical equipment

2081 Electrical equipment for coal and shale mines—Electrical protection devices
- Part 2: Earth-continuity monitoring devices (AS 2081.2)
- Part 3: Earth-leakage protection devices for use on systems incorporating earth-fault current limiters (AS 2081.3)
- Part 4: Lockout earth-fault protection devices (AS 2081.4)
- Part 5: Earth-fault current limiters (AS 2081.5)

3000 SAA Wiring Rules

1.3 DEFINITIONS. For the purpose of this Standard, the definitions below apply.

1.3.1 Back-up protection—protection provided as a supplement to the main protection of the system being protected, which is required to operate in the event of failure of the main protection.

1.3.2 Circuit interrupting device—device capable of making, carrying and breaking normal load currents and also making and automatically breaking (under predetermined conditions) abnormal currents, such as short-circuit currents.

1.3.3 Core-balance earth-leakage protection—protection in which a current transformer (termed a 'core-balance transformer') monitors all active conductors and neutral conductors, where appropriate, of a system, and produces a residual current output which operates a relay when an earth fault occurs on the protected system.

1.3.4 Current-transformer-operated (residual current) earth-fault protection—protection which is operated by the out-of-balance current produced by a parallel connected group of current transformer secondary windings, each winding related to an independent current transformer located in each active conductor of a system, the operating current resulting from an earth-fault on a protected system.

1.3.5 Earth-continuity monitoring system—form of monitoring normally provided to confirm the integrity of the earthing conductor(s) in cables supplying equipment. It operates when the earth-loop resistance exceeds a predetermined value, or when a short-circuit between the pilot and earth occurs.

1.3.6 Earth-fault current—current that will flow between an energized conductor and an earthed conductor and the general body of the earth as the result of insulation failure.

1.3.7 Earth-fault current limitation—system where the magnitude of earth-fault current is limited by an impedance device (zero sequence reactor or a neutral point impedance) to prescribed values.

1.3.8 Earth-fault protection—protection provided to detect earth-fault current and isolate the electrical supply from a fault zone.

1.3.9 Earth-leakage current—current which flows between an energized conductor and an earth conductor to the general body of the earth as the result of reduction in the value of insulation resistance.

1.3.10 Earth-leakage protection—protection provided to detect earth-leakage current and isolate the electrical supply from any fault zone.

1.3.11 Lockout earth-fault protection—protection which prevents a circuit being energized if the insulation resistance to earth of one or more of the conductors is below a predetermined value.

1.3.12 Main protection—protection normally provided to initiate tripping of the circuit interrupting device on the occurrence of a fault in the protected zone.

1.3.13 Neutral-connected (zero-sequence) impedance—impedance which is connected between the neutral point of a transformer winding and earth to restrict the earth-fault current in the circuit supplied from that winding.