Australian/New Zealand Standard™

Electrical equipment for coal and shale mines—Electrical protection devices

Part 3: Earth-leakage protection systems for use on earth-fault current limited systems (IT systems)

Standards Australia

STANDARDS NEW ZEALAND
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The following are represented on Committee EL-023:

Australian Chamber of Commerce and Industry
Australian Coal Association
Australian Electrical and Electronic Manufacturers Association
Australian Industry Group
Department of Mineral Resources N.S.W.
Department of Natural Resources and Mines (QLD)
Electrical Apparatus Service Association
Mining Electrical and Mining Mechanical Engineering Society
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-023, Electrical Equipment in Coal Mines, to supersede AS 2081.3—1988, *Electrical equipment for coal and shale mines—Electrical protection devices,* Part 3: *Earth-leakage protection devices for use on systems incorporating earth-fault current limiters.*

The AS/NZS 2081 series comprises the following parts:

AS/NZS

Part 1: General requirements

Part 2: Earth-continuity monitoring devices

Part 3: Earth-leakage protection systems for use on earth-fault current limited systems (IT systems) (this Part)

Part 4: Lockout earth-fault protection devices

Part 5: Earth-fault current limiters

The key objectives of the AS/NZS 2081 series are as follows:

(a) To ensure touch and step time/voltage levels are within acceptable limits.

(b) To minimize the risk of explosion due to arcing.

(c) To ensure earth return path(s).

(d) To ensure reliable operation under operating conditions.

(e) To ensure performance criteria are maintained under operating conditions.

(f) To minimize the risk of fires initiated from electrical arcing.

(g) To minimize exposure to electrical contact with live parts.

In the AS/NZS 2081 series, levels were established using data provided in AS 3007.2 *Electrical installations—Surface mines and associated processing plants,* Part 2: *General protection requirements,* with respect to the physiological effects of electricity on the human body. The preservation of the integrity of other equipment was an important consideration in the preparation of this series.

This Standard differs from the previous edition in the following ways:

(a) The inclusion of a typical system electrical diagram showing the application of all of the above protection system and highlighting the particular protection system as detailed in this Standard.

(b) The Standard has been published as a Joint Australian/New Zealand Standard.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

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FOREWORD

The interrelationship of the ‘techniques’ described in the five Parts of this series strives to create as safe a working environment as possible. In this environment of surface and underground mines electrically powered equipment is often mobile and supplied by trailing or reeling cables.

These ‘techniques’ are as follows:

(b) The continuous checking that the equipment is earthed, by monitoring the pilot loop earth in the supply cable, its connection to the machine it is supplying and its termination at the substation supplying the machine (AS/NZS 2081.2).

NOTE: This system may incorporate remote start/stop features.

(c) The measurement of leakage current to earth in a circuit and the initiation of isolation of that circuit, when the value reaches or exceeds a predetermined safe value (see this Standard).

(d) The pre-energization testing of a circuit, to determine that the phase-to-earth insulation value of each and every phase conductor is above a present value, before the circuit can be energized (see AS/NZS 2081.4).

(e) The use of earth current limiting devices, to minimize the risk of touch and step potential reaching a level which would cause risk to personnel (see AS/NZS 2081.5).

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out minimum performance requirements for earth-leakage protection devices used on a.c. power supply systems having an earth-fault current limitation system (IT system). The devices are intended to—

(a) continuously monitor the earth-leakage current; and

(b) initiate tripping of the circuit interrupting device when the level of earth-leakage current and time exceed the predetermined values.

NOTES:

1 Whereas this Standard is based upon 50 Hz supply systems it is envisaged that equipment may be installed upon higher or low frequency supply systems.

Consideration of the effects of these installations upon current limitation and effects upon the human body need to be considered. IEC 60479-1 and IEC 60479-2 should be referenced for the effects upon the human body of other supply frequencies.

2 Installation guidelines are provided in Appendix A.

1.2 OBJECTIVE

The objective of this Standard is to establish requirements for earth-leakage protection systems for use on earth-fault current limited systems, in order to ensure that the earth leakage protection being provided to the equipment will—

(a) minimize risk of explosion due to arcing;

(b) ensure reliable operation under normal operating conditions;

(c) ensure performance criteria are maintained under normal operating conditions;

(d) minimize the risk of fires caused by electrical arcing; and

(e) minimize exposure to electrical contact with live parts.

1.3 RELATIONSHIP TO REGULATIONS

The requirements of this Standard may be read in conjunction with, but do not take precedence over, regulations of a regulatory authority that may apply in a specific area.