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Australian Standard 3007, Part 2—1982

ELECTRICAL INSTALLATIONS FOR OUTDOOR SITES UNDER HEAVY CONDITIONS (INCLUDING OPEN-CAST MINES AND QUARRIES)

Part 2—GENERAL PROTECTION REQUIREMENTS

STANDARDS ASSOCIATION OF AUSTRALIA
Incorporated by Royal Charter

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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Australasian Institute of Mining and Metallurgy

Australian Electrical and Electronic Manufacturers Association

Confederation of Australian Industry

Consulting Engineers

Department of Mineral Resources, N.S.W.

Department of Mines, Qld

Electricity Supply Association of Australia

Joint Coal Board

Mines Department, Tas.

Mining interests

This standard, prepared by Committee ET/1, Electrical Installations for Outdoor Sites Under Heavy Conditions (Including Open Cast Mines and Quarries), was approved on behalf of the Council of the Standards Association of Australia on 4 February 1982, and was published on 15 June 1982.

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AUSTRALIAN STANDARD

ELECTRICAL INSTALLATIONS FOR OUTDOOR SITES UNDER HEAVY CONDITIONS (INCLUDING OPEN-CAST MINES AND QUARRIES)

Part 2
GENERAL PROTECTION REQUIREMENTS

AS 3007.2—1982

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PREFACE

This standard was prepared by the Association's Committee on Electrical Installations for Outdoor Sites Under Heavy Conditions (Including Open-cast Mines and Quarries).

It constitutes Part 2 of AS 3007 and is essentially identical with IEC 621-2, as supplemented by IEC 621-2A, which were prepared by the counterpart IEC Technical Committee, i.e. TC 71. Points of difference from the IEC standards are highlighted by means of a marginal bar.

Australia was instrumental in the formation of IEC TC 71 and has held the responsibility for the Secretariat of the IEC committee since its inception in 1970.

The counterpart Australian committee (ET/1) has actively participated in the work of IEC TC 71 which has as its objective the development of uniform and internationally acceptable rules for the safe use of electricity in open-cast mines, quarries, stockpiles and the like. Such applications present particularly onerous conditions for the electrical apparatus and systems, including continual alteration of the location of the apparatus and systems, extension of the operational area, and adverse environmental conditions. Because of the size of the plant and the need for mobility, supply is frequently at high voltage over long distances, by means of trailing cables. This should be compared with other industries where the electrical installations are generally fixed.

The composite standard prescribes requirements for the installation and operation of electrical apparatus and systems in the abovementioned locations, with the object of ensuring the safety of persons, livestock and property. AS 3007, Part 1 outlines the scope of the composite standard and provides definitions for some of the terms used. This standard (AS 3007, Part 2) specifies the measures which are required for protection against electric shock in normal service from direct contact with live parts, for protection against electric shock from parts which may become live in the event of a fault (indirect contact), and for protection against the effects of overcurrent resulting from overload or short-circuit conditions. AS 3007, Part 3 prescribes general requirements for the equipment and ancillaries associated with the electrical installation.

The standard recognizes several types of power supply system and prescribes the protective measures which are necessary for each system. Requirements for the protection of personnel from indirect contact (Section 2) are based on the concept of permissible voltage versus time limits, which take into account the pathophysiological effects of electric current passing through the human body, the typical industry conditions, and the probability of personnel being in contact with the plant. In this and other respects, the standard differs in approach from the practically evolved rules of AS 3000, SAA Wiring Rules.

It will therefore be necessary for the statutory authorities concerned to clearly delineate the respective areas of application for this standard and for AS 3000.

IEC TC 71 is continuing the development of further parts of IEC 621, and consideration will be given to the issue of additional parts of this Australian standard when the corresponding IEC publications become available.

This standard may require reference to the following Australian and IEC standard:

AS 1939	Classification of Degrees of Protection Provided by Enclosures for Electrical Equipment
AS 3007	Electrical Installations for Outdoor Sites Under Heavy Conditions (Including Open-cast Mines and Quarries) Part 4—Requirements for the Installation*
IEC 364	Electrical Installations of Buildings 364-3 Part 3: Assessment of General Characteristics 364-4-41 Part 4: Protection for Safety Chapter 41: Protection Against Electric Shock

*In course of preparation.

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ELECTRICAL INSTALLATIONS FOR OUTDOOR SITES UNDER HEAVY CONDITIONS (INCLUDING OPEN-CAST MINES AND QUARRIES)

PART 2—GENERAL PROTECTION REQUIREMENTS

SCOPE OF PART

This standard prescribes general protection requirements for electrical installations within the scope of AS 3007, Part 1. It outlines the measures which are required for protection against electric shock in normal service from direct contact with live parts; for protection against electric shock from parts which may become live in the event of a fault (indirect contact); and for protection against the effects of overcurrent resulting from overload or short-circuit conditions.

SECTION 1. PROTECTION AGAINST DIRECT CONTACT

(Protection against electric shock in normal service)

INTRODUCTION. In this Section, the requirements for protection against direct contact are described for all installations with voltages up to and including 1000 V and with those above 1000 V. The requirements for installations for voltages up to 1000 V are taken over essentially from IEC Publication 364, Electrical Installations of Buildings, as applicable.

1 GENERAL REQUIREMENTS. Except as provided in Sub-clause 1.1, protection against direct contact shall be provided by compliance with the requirements contained in Clause 6 and in one of the Clauses 2, 3, 4 or 5.

1.1 Exceptions to the General Requirements.

(a) *Limitation of voltage.* Protection against direct contact is deemed to be ensured where a protective measure "safety extra low voltage" or "functional extra low voltage" is used. Refer to IEC Publication 364-4-41, Part 4: Protection for Safety; Chapter 41: Protection Against Electric Shock.

(b) *Limitation of discharge of energy.* Protection against direct contact is deemed to be ensured where the energy available from the supply source is limited to a safe value.

(c) *Neutral and protective conductors.* Protection against direct contact for neutral and protective conductors is deemed to be ensured when such conductors are installed in accordance with the applicable sub-clauses (see Sub-clauses 7.1, 9.5, 10.1 and 11.2).

2 COMPLETE PROTECTION BY MEANS OF BARRIERS OR ENCLOSURES. Barriers or enclosures are intended to prevent contact of persons or livestock with live parts of the electrical installation.

The minimum electrical clearance distances in air between field-installed bare conductors and between such conductors and earthed parts (such as barriers and enclosures) shall be in accordance with Table 1 or 2. The clearance distances in these tables need not apply within electrical apparatus, wiring devices or manufactured assemblies.

These tables take into consideration the fact that the system voltage may vary up to 20% from the rated operating voltage.

The tables may be used to indicate clearance distances between conductors and earth in a TN or TT system by using the phase-to-earth voltage.

These minimum clearance distances do not take into consideration such factors as creepage distances, different voltage levels in the same area nor extreme environmental conditions etc.

NOTE: The requirements for 'creepage distances' and 'safety distances' are under consideration.

2.1 Protection from Live Parts. All live parts shall be inside enclosures or behind barriers providing at least the degrees of protection in accordance with Table 3.

2.2 Strength and Stability of Barriers and Enclosures. Barriers and enclosures shall be firmly secured in place. Taking into account their nature, size and arrangement, they shall have sufficient stability and durability to resist the strains and stresses likely to occur in normal service.

2.3 Access to Installation. Where is it necessary to make provision for the removal of barriers, the opening of enclosures, or the withdrawal of parts of

TABLE 1

CLEARANCE DISTANCES FOR INDOOR INSTALLATIONS

Maximum r.m.s. value of rated operating voltage (kV)	1	3	6	10	20	30	45	60	110
Minimum distance for installations subject to overvoltages (mm)	40	65	90	115	215	325	520	700	1100
Minimum distance for installations protected against overvoltages or connected to both incoming and outgoing cables (mm)	40	60	70	90	160	270	380	520	950

TABLE 2

CLEARANCE DISTANCES FOR OUTDOOR INSTALLATIONS

Maximum r.m.s. value of rated operating voltage (kV)	10	20	30	45	60	110	150	220
Minimum distance for installations subject to overvoltages (mm)	150	215	325	520	700	1100	1550	2200
Minimum distance for installations protected against overvoltages or connected to both incoming and outgoing cables (mm)	150	160	270	380	520	950	1350	1850