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1987 ed

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

Part 4—REQUIREMENTS FOR THE INSTALLATION

3007 **Part 4—1987 Additional requirements for specific applications**
A4 15pp *D*

Sets out additional requirements which are specific to particular installations. Sections deal with winning, stacking and primary processing machinery, transport conveyor systems, pumping and water supply systems and secondary processing machinery. Guidelines for the installation of low signal level systems and communication systems are provided in an appendix. Technically equivalent to IEC 621-4.

Committee EL/33. ***Supersedes*** *AS 3007.4—1985; Draft for comment DR 86010.* ***Publication date*** *1987-05-04; ISBN 0 7262 4618 2*

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The following interests are represented on Committee EL/33:

Australian Electrical and Electronic Manufacturers Association
Australian Institute of Mining and Metallurgy
Confederation of Australian Industry
Consulting Engineers
Department of Industrial Relations, N.S.W.
Department of Mines, Qld
Department of Mines, Tas.
Electricity Supply Association of Australia
Joint Coal Board
Mining Interests

This standard was issued in draft form for comment as DR 83098.

AUSTRALIAN STANDARD

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

Part 4
REQUIREMENTS FOR THE INSTALLATION

AS 3007.4—1985

First published 1985

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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 4 of the AS 3007 series and is essentially identical with IEC 621-4 which was prepared by the corresponding IEC Technical Committee, i.e. TC 71. Where this standard deviates technically from IEC 621-4 by way of different or additional requirements, this is indicated by a rule in the margin against the clause, or part thereof, affected. A summary of such technical variations is given in the Annex.

Some requirements are repeated in different sections of the standard. This arises from a decision by IEC TC 71 to consider separately the requirements which should apply for particular types of installation. The IEC committee intends that the requirements which are found to be common should ultimately be transferred to IEC 621-3 (Australian equivalent—AS 3007, Part 3) as a general requirement for all installations.

The counterpart Australian committee (EL/33) 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 AS 3007 series 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. 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. AS 3007, Part 4 (this standard) sets out the requirements which are specific to particular installations, together with any exemptions from the general requirements of AS 3007, Parts 2 and 3, which apply for such installations.

The AS 3007 series 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 of AS 3007, Part 2) are based on the concept of permissible voltage versus time limits, which take into account the patho-physiological effects of electric current passing through the human body, the typical industry conditions, and the probability of persons being in contact with the plant. In this and other respects the AS 3007 series 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.

The standard may require reference to the following Australian and IEC standards:

AS 1755	SAA Conveyor Safety Code
AS 3007	Electrical Installations for Outdoor Sites Under Heavy Conditions (Including Open-cast Mines and Quarries) Part 1—Scope and Definitions Part 2—General Protection Requirements Part 3—General Requirements for Equipment and Ancillaries Part 5—Operating Requirements*
IEC 353	Line Traps
IEC 481	Coupling Devices for Power Line Carrier Systems
IEC 495	Recommended Values for Characteristic Input and Output Quantities of Single Sideband Power Line Carrier Terminals

* In course of preparation

IEC 536 Classification of Electrical and Electronic Equipment with regard to Protection against Electric Shock

IEC 663 Planning of (Single-sideband) Power Line Carrier Systems

BS 4992 Guide to Protection against Ignition and Detonation Initiated by Radio Frequency Radiation

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

PART 4—REQUIREMENTS FOR THE INSTALLATION

SCOPE OF PART

This standard sets out the requirements which are specific to particular installations within the scope of AS 3007, Part 1, together with any exemptions from the general requirements of AS 3007, Part 2 and Part 3 which apply for such installations.

NOTE: Appendix B provides guidelines for the installation of low signal level systems and communication systems.

SECTION 1. WINNING, STACKING AND PRIMARY PROCESSING MACHINERY

INTRODUCTION. This Section specifies the requirements which particularly apply to the electrical equipment of winning, stacking and primary processing machinery.

The requirements of AS 3007, Part 2 and Part 3, shall apply except where specific exemptions are allowed in this Section.

Where conveyor systems are incorporated as part of winning, stacking and primary processing machinery, the requirements of Section 2 shall also apply.

1 SPECIAL ADDITIONAL REQUIREMENTS FOR AND EXEMPTIONS FROM THE NORMAL PROTECTION AGAINST DIRECT AND INDIRECT CONTACT.

1.1 Off-board mobile and movable auxiliary equipment. For off-board mobile and movable auxiliary equipment (e.g. welding equipment, vulcanizing transformers) which require the provision of a protective conductor, either the protective conductor shall be visible throughout its length or one or more of the following measures shall be adopted:

(a) The protective conductor shall be monitored for increase in resistance.

(b) Sensitive earth leakage protection shall be provided.

(c) A visible equipotential bonding conductor shall be provided between the off-board mobile or movable auxiliary equipment and the plant from which it is supplied.

1.2 Insulation monitoring device for IT systems. In IT systems, insulation monitoring devices are not required for power circuits which are supplied by a power source from within the machine, such as by a transformer having electrically isolated windings, or by a generator or storage battery.

1.3 Insulation monitoring devices for vulcanizing heating platens. In IT systems, insulation monitoring devices are not required for vulcanizing heating platens where the power circuit is supplied from a transformer having electrically isolated windings.

1.4 Electric hand tools.

(No requirement at present)

1.5 Electric hand lamps.

(No requirement at present)

2 DUTY CYCLE. The requirements of Clause 2.1 and 2.2 apply to drives with a periodic or cyclic duty as well as to certain other drives with a continous duty.

2.1 Effects on voltage levels. The effects of equipment starting and of the duty cycle on voltage levels, which may result in damage or the malfunction of equipment, shall be taken into consideration to ensure the safety of persons and equipment.

2.2 Supply systems. The effect of load fluctuations on the supply system shall be considered, taking account of any restrictions imposed by the electricity supplier.

3 EXTERNAL POWER SUPPLY SYSTEMS.

3.1 System design. The supply system shall meet the requirements of cyclic or periodic loads, motor starting, and inherent a.c. motor oscillations due to transient load changes. For protection requirements against direct and indirect contact, see AS 3007, Part 2.

3.2 Overcurrent protection. Overload and short-circuit protection for transformers, cables, etc shall take into consideration the starting requirements and cyclic nature of the load.

3.3 Automatic reclosing or transferring. Where regeneration may delay the operation of overvoltage devices, automatic reclosing or transferring devices shall not be used in the power distribution system unless one or more of the following conditions apply:

(a) Such devices have sufficient time delay to allow motor disconnection (see Clause 6.2).

(b) The device is fitted with 'out of step' protection.

(c) The combination of supply system and motor design characteristics is such as to permit automatic re-energization.

3.4 System voltage. Consideration shall be given as to whether the system voltage specified is under no-load or full load conditions.

4 SELF-CONTAINED POWER SYSTEMS.

4.1 System design. The power generation systems shall meet the requirements of motor starting, regeneration, peak load, r.m.s. load and frequency stability.

4.2 Fire protection. Consideration shall be given to the need for special and/or additional fire protection due to the fuels used (see Section XX* of AS 3007, Part 3).

4.3 Earthing. When the supply of electrical energy is self-contained within stationary, mobile, or movable items of equipment and there is no external supply, such equipment need not be connected to the general mass of the earth.

4.4 Supply to off-board equipment. When power is supplied to off-board mobile and movable equipment the requirements of Clause 1.1 shall apply.

5 CABLE TYPES.

(No requirement at present)

6 CONTROL CIRCUITS AND CONTROL DEVICES.

6.1 Shock, vibration and voltage fluctuations. The effect of shock, vibration or voltage fluctuations on control devices shall be taken into consideration, ensuring that the safety of persons and equipment is not endangered by inadvertent operation of control devices (see also Clause 5 of AS 3007, Part 3).

When mechanically latched control devices are used and re-energization following loss of supply power would endanger persons or equipment, means shall be

* In course of preparation—to be incorporated in a new edition of AS 3007, Part 3.