



Industry &
Investment

Industry Standards Program

For

Electrical Engineering Safety

2009 - 2014

A basis for fit for purpose electrical equipment and systems

Program for establishing standards, guidelines, technical reference, handbooks and other advisory information for Electrical Engineering Safety in the NSW Mining (Coal, Metals and Extractive) & Onshore Petroleum (exploration and extraction) Industries

TEST BEFORE YOU TOUCH

NO LIVE LINE WORK

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INDUSTRY STANDARDS PROGRAM - 2009-2014 V6.DOC

Foreword

This document should be read in conjunction with the Mine Safety Operations Strategic Plan for Electrical Engineering Safety. It deals specifically with a program of developing Industry Standards. Industry standards are an essential tool in achieving specific Mine Safety targets for electrical engineering safety. Industry Standards fit well with contemporary OH&S legislation and are a source of essential information. Industry Standards provide:

- Useful information for all industry stakeholders and are essential to implementing sound engineering.
- A contemporary basis to which existing and proposed mining operation site installations and plant can be compared as a starting point for making sound engineering decisions.
- A minimum compliance basis to which plant designers and suppliers can benchmark their existing and proposed plant.
- In the future, it is possible that compliance to standards will satisfy essential safety outcomes specified in legislation, that is establish a tolerable and ALARP risk.

Industry standards are a repository for technical and practical information with established assessment and test criteria. Industry standards often document human experience, proven engineering methods, solutions to known problems, well established risk controls, proven engineering design and hard earned lessons. Not only are these standards useful today, but they will be a useful source of information for our successors.

Industry standards are also a source of contemporary engineering and management methods, in particular in the area of risk management and functional safety. Industry standards can be revised at suitable intervals to ensure ongoing improvements and relevance by industry stakeholders.

For all of these reasons Industry Standards are a cornerstone for fit for purpose electrical equipment, systems, installations and practices, and without them a great deal of resources would be expended “re-inventing the wheel”.

Industry Standards consist of:

- Australian Standards.
- International Standards.
- Mine Safety Operations MDG's.
- Mine Safety Operations Electrical Engineering Safety Technical references.
- Workcover CoP's.
- Handbooks.
- Information Sheets
- Electrical Engineering Safety Decision Sheets

A structured Industry standards program will:

- Develop guidance on the life-cycle management of electrical engineering safety.
- Facilitate intelligent and informed decision making in matters of electrical engineering safety.
- Facilitate safe plant design that incorporates life-cycle considerations.
- Provide a risk based engineering process that delivers engineered risk controls with the appropriate safety integrity.
- Develop guidance on competency requirements for electrical workers, mine electrical engineers and hazardous area equipment workers.
- Develop guidance on safe electrical work systems and procedures.
- Develop guidance on emerging technical and practical mining issues (eg high voltage distribution underground, safety critical systems, and high energy explosion protection).
- Develop an industry culture of standards use through industry ownership of standards and guidance material, and reinforce workplace responsibility for OHS management.
- Evaluate international technical standards prior to adoption into Australia.
- Apply a consistent approach and format to technical guidance material that reflects its role in the legislative framework.
- Embody the minimum expectations of the regulator.

John Francis Waudby
Senior Inspector of Electrical Engineering



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Purpose of this Document

The Industry Standards Program will be integrated with the Industry Support Infrastructure Program and the Special Projects (High Risk Plant) Program and be used by Electrical Engineering staff of Mine Safety Operations to:

- Develop standards that can deliver fit for purpose equipment, competencies, management systems and work processes for use at mining operations.
- Provide industry with contemporary advice on the design and life-cycle management of electrical systems and machinery
- Prepare work plans for a 1 year and 3 year outlook.
- Show other officers in Mine Safety Operations what we are trying to do and why we are trying to do it.
- Solicit constructive comment on our industry standards activities to help us improve.

Other industry stakeholders will benefit from the document by being able to align their expectations with a documented plan, and participate in industry standards programs knowing what the important standards are and which standards are in what stage of development / implementation. In particular mining operations will be able to integrate industry standards work with mine management plans, electrical engineering management plans and standards of engineering practice (SEP's).

Internal and external organisations will be able to adjust their own processes to integrate with the processes documented here for greater efficiency and effect.



Policy concerning Industry Standards.

Mine Safety Operations:

It is Mine Safety Operations policy to only develop Industry Codes of Practice as agreed in the peak safety committees. Where industry fails to perform adequately, this may initiate the development of an appropriate Code of Practice using the agreed industry consultation process.

The development of Australian and International Standards that facilitate a safer industry is a key strategic requirement.

Electrical team:

Develop industry standards for Electrical Engineering Key Risk Areas and Electrical Engineering Safety Key Risk Controls through a planned program that will:

- Adopt appropriate standards guidelines, codes of practice and handbooks from the non-mining industry
- Develop technical references to support legislation
- Focus on the development and review of Australian and International Standards in preference to Mine Safety Operations Guidelines
- Develop Mine Safety Operations Guidelines, Technical References, Information Sheets or Electrical engineering Safety Decision Sheets where there is no equivalent Australian or International Standard and there is an immediate need (safety and Mine Safety Operations operational)
- Where Mine Safety Operations Guidelines and Technical References are required – develop, implement and transform into Australian Standards

Electrical team policy statement 1. Australian Standards

- Australian Standards are created by appropriate personnel, to which the Standard relates.
- Draft Australian Standards are important and must be thoroughly reviewed prior to their release to ensure the views of Mine Safety Operations are represented and that industry is aware of the foreseeable impacts of implementation.
- Draft Australian Standards are not applied in enforcement actions; however, they are a point of reference for the electrical team.
- The defined year of print of an Australian Standard is the year of implementation.
- Australian Standards are not retrospective, however:
 - When a Plant is installed to an Australian Standard that plant remains compliant within that standard as long as the plant is maintained to that standard.
 - Subsequent Australian Standards which supersede the standard, to which the plant was installed, should be assessed to determine if the latter Standard has identified issues which create a hazard to the plants operation in its current state.
 - Appropriate action should be taken to remove the hazard from the plant which the latter Standard identified.
 - When extensions / upgrades / modernisations are made to an existing plant, the current standard should be the benchmark.
 - There is no requirement to upgrade an existing plant to the latter Standard, if there are no issues identified in the latter Standard which are assessed as creating a hazard in the original plants operation.
- The Occupational Health and Safety Standards Coordination Group (OHS SCG) have developed a generic solution with the view that:-
 “Retrospectivity should be implemented only where major safety issues are involved, and even then it is necessary for Regulatory Authorities to treat the matter with sensitivity”
- All appropriate Australian Standards are attempting to have some form of wording which incorporates the concept of a time frame for compliance.

Electrical team policy statement 2. Australian Standards

Tuesday, 20 January 2004 – Letter to industry (ID 292232000)



Standards and Guidelines Program for Electrical Engineering Safety

Re: Standards for Electrical Equipment (apparatus and cables) used in NSW coal mines.

Standards for electrical equipment and installations can be considered a minimum standard to be achieved in providing a safe workplace.

There are a number of Standards that relate specifically to electrical equipment used in coal mines, which are amended from time to time. When a standard is amended, Mine Safety Operations expects all relevant parties to review the standards; in particular any changes, and give due consideration to upgrading electrical equipment to the latest standard, as soon as practicable and in a manner appropriate to the level of risk.

The application of some standards can be made mandatory by legislation. AS2081 “Electrical equipment for coal and shale mines – Electrical protection devices,” is such a standard. Clause 140(3) Coal Mines (Underground) Regulation 1999 requires electrical protection for earth leakage, earth continuity or earth fault lockout underground at the mine to comply with AS2081.

Clause 140(3) came into effect in 1999; the standard to which it referred was AS2081: 1988. In August 2002 AS2081 was amended and republished as AS/NZS 2081:2002. Clause 140(3) does not specify whether amendments to AS2081: 1988 are mandatory or not. The issue becomes when equipment should be upgraded to comply with the amended standard.

Mine Safety Operations expects

1. All relevant parties review standards when they are re-published; in particular any changes, and plan to upgrade electrical equipment to the latest standard, at the first repair, overhaul or conformance modification opportunity and in a manner appropriate to the level of risk.
2. New equipment complies with the latest standard or complies with any requirements imposed under product certification schemes such as the AUS Ex Scheme, ANZ Ex Scheme and IEC Ex Scheme.
3. In particular, that earth leakage, earth continuity and earth fault lockout devices comply with AS2081: 1988, and a plan to upgrade to AS2081: 2002 are implemented consistent with the above advice.

Electrical team policy statement 3. Australian and International Standards

There are many Australian and International Standards related to electricity. They are a point of reference for the electrical team. The electrical team is expected to use standards that are considered relevant. For example: A mine wishes to install 33kv systems underground – a critical reference standard would be standards relating to “Insulation Coordination”, although there is no foreseeable reason why the Mine Safety Operations should be represented on that standard.

The electrical team will only participate in the development of Australian and International Standards where it coincides with electrical engineering safety priorities for us.

Individuals are free to comment on any standard to the relevant standards committee at any time but must make that comment as an individual, not as a Mine Safety Operations representative.

Where an individual identifies a need for Mine Safety Operations to comment on any standard, the matter must be discussed at an electrical engineering, mine safety operations meeting and authorised by the SIEE before comment is made. The individual will be responsible for that correspondence.

For standards where Mine Safety Operations is represented, feedback on current work will be given at electrical engineering, mine safety operations meetings and topical matters discussed. The responsible Mine Safety Operations representative will take the electrical team’s position back to the relevant committee. The responsible Mine Safety Operations representative will inform the SIEE on any contentious matter that is not consistent with the Mine Safety Operations position.

Electrical team policy statement 4. Australian and International Standards

When developing or reviewing standards they should:

- Adopt current authoritative good practice
- If a risk control in an Australian Standard is to be varied then the new control -
 - Must provide for a level of risk < or = to the original standard.
 - Must not transfer the risk control from a design feature in the standard to a user's procedure.



Standards and Guidelines Program for Electrical Engineering Safety

Electrical team policy statement 5. Australian and International Standards

Refer to Industry Standards Issues Document for matters to be addressed during Standards review



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Mine Safety Planning & Industry Standards

Within the Strategic Plan for Electrical Engineering Safety in NSW Mines there is a strategy for Legislation and industry standards development and it states:

OBJECTIVES

Industry Standards for electrical equipment provide guidance on all aspects of electrical engineering safety and complement the legislation. The strategic plan also identifies the key risk controls that must be in place, usually in combination, and which are critical to realising the vision. The Industry standards program is designed to give guidance in each of these aspects.

OUTCOMES

Mines have total responsibility for ensuring electrical technology is used in a safe manner.

Information on electrical engineering safety risk controls is readily available for mine operators, manufacturers and suppliers of plant, service providers and other stakeholders

Information on electrical engineering safety risk controls is readily available for the Mine Safety Operations electrical team.

Industry standards encompass all the electrical engineering safety key risk controls

Industry standards encompass all types of electrical plant, installations and systems.

STRATEGIES

Industry Standards

Identify Australian and International Standards committees that are important for electrical engineering safety at mine sites.

Participate on those Australian and International standards committees with a significant relevance to mining.

Participate on those Australian and International standards committees that are contemporary in relation to safety of plant.

Comment on Australian and International standards for general industry that are applicable to improving mine safety.

Good liaison maintained between the Mine Safety Operations and interstate agencies.

Document hard earned lessons, successful practical experience and proven good engineering practice.

Develop Mine Safety Operations guidelines in specialist areas.

Develop Technical References, Information Sheets and Electrical Engineering Safety Decision Sheets to support legislation and “fill in the gaps”.

Aim for Mine Safety Operations guidelines to be developed into Australian Standards.

Monitor the application of Standards Australia New Business Model & governance matters.

Create strategic alliances with other Standards Australia stakeholders

WHAT ARE INDUSTRY STANDARDS?

Industry standards encompass:

- Australian Standards.
- International Standards.



Standards and Guidelines Program for Electrical Engineering Safety

- Mine Safety Operations MDG's.
- Mine Safety Operations Electrical Engineering Safety Technical references.
- Workcover CoP's.
- Handbooks.
- Information Sheets (These are generated as industry knowledge gaps are identified, particularly for small quarrying operations)
- Electrical Engineering Safety Decision Sheets (These are generated in response to issues that are likely to be relatively common so that consistent advice can be given by officers, they are normally finalised at an IEE meeting)

They are documents that provide technical and practical guidance or specific requirements on management systems, management methods, specific risks, specific equipment and specific applications.

INDUSTRY STANDARDS IN CONTEXT

Access and use of advisory material such as standards, guidelines, technical references, codes of practice is essential for each of the elements of the MIRM Model detailed in the strategic plan for electrical engineering safety. Further, through the development of such material come ownership, deeper understanding and confidence in decision making.

For over 25 years, Mine Safety Operations Mine Safety (in all its former guises) has recognised the importance of establishing advisory material and promoting its use in improving mining electrical engineering safety. Mine Safety has been instrumental in initiating numerous coal mining Australian Standards & Handbooks, participating and adding value to numerous other electrically related Australian Standards & Handbooks and International Standards. Specific departmental guidelines have also been developed and implemented.

Much of the advisory material has been developed from proven practical experience, proven engineering design, accidents, incidents and near misses. There has also been a significant adoption of contemporary OH&S, Risk Management and Engineering Management and knowledge and practices. Also, Mine Safety has recognised that the development of such advisory material extends to other engineering disciplines and management.

WHAT'S HAPPENING NOW

The development of industry standards is a central and key area for the strategic plan for electrical engineering safety. To maximise the benefit and to allow the efficient use of **Mine Safety Operations** resources there has to be a focus on the most important industry standards without "losing sight" of the "whole picture".

A key requirement is to encourage more industry input.

MEASURES / TARGETS

Number of standards and published. Target = 3/year (whole of Mine Safety)

Number of standards reviewed. Target =10/year (whole of Mine Safety)

Guidance Notes published = 4/year (whole of Mine Safety)

Guidance Notes reviewed = 4/year (whole of Mine Safety)

Number of Technical publications = 1/year (business plan)



Part 2 – Industry Standards Products

*Detailed description
of the
Industry Standards and their relevance*

Note: Technical references relating to licensing of cable repair workshops and competency of cable repairers is dealt with in the Industry Infrastructure Support Program.



Electrical technology management systems (incorporating incident investigation)

Important Industry Standards

AS/NZS4360

AS4801

AS4804

MDG1010

EES001 Technical Reference - Electrical Engineering Management Plan.

EES003 Technical Reference – Practices for the Life-Cycle Management of Explosion Protected Equipment.

EES008 Technical Reference – Life-Cycle Management of Powered Winding Systems (Draft)(Mdg2005).

EES011 Technical Reference - Technical Principles for the Design of Electrical Systems

EES013 Technical Reference - Electrical Engineering Safety –Guide to the Mine Health and Safety Regulation 2007 and Occupational Health and Safety Regulation 2001

Risk Management & Classification of hazardous areas

AS/NZS4360

Relevance of Standard

Provides principles of risk management

Application by Industry

Risk Management systems used by industry stakeholders are consistent with AS/NZS4360

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|------------------------|-----------------------------|--------------------------------------|----------------|----------------------|
| None | Public comment process | Any / all electrical staff. | Australian Standards Project Officer | Correspondence | IEE meeting – ad hoc |

AS/NZS4801 & AS/NZS4804

Relevance of Standard

Provides principles and guidance on OH&S management

Application by Industry

OH&S management systems used by industry stakeholders are consistent with AS/NZS4801 & AS/NZS4804

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|------------------------|-----------------------------|----------------------|----------------|----------------------|
| None | Public comment process | Any / all electrical staff. | Australian Standards | Correspondence | IEE meeting – ad hoc |



Standards and Guidelines Program for Electrical Engineering Safety

| | | | | | |
|--|--|--|-----------------|--|--|
| | | | Project Officer | | |
|--|--|--|-----------------|--|--|



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Standards and Guidelines Program for Electrical Engineering Safety

MDG1010

Relevance of Standard

Provides principles of risk management as applied in the mining industry

Application by Industry

Risk Management systems used by industry stakeholders comply with MDG1010 as a minimum or demonstrate equivalence

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|---------------------------------------|-----------------------------|----------|----------------|--------------|
| SIME | Mine Safety Operations review process | Any / all electrical staff. | SIME | Correspondence | MDG WG |

EES001 – ELECTRICAL ENGINEERING MANAGEMENT PLAN (EEMP)

Relevance of Standard

Provides details of Mine Safety Operations expectations of the content of a mine EEMP and integration into the mine OH&S Management System. It encompasses all the legislative requirements.

Application by Industry

Mine EEMP's comply as a minimum to EES001

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|-------------------------|-----------------------------|----------|---------------------------------|-------------------------|
| SIEE Waudby | IEE CSAC, & EE Meetings | Any / all electrical staff. | SIEE | Correspondence, meeting minutes | IEE CSAC, & EE Meetings |

EES013 – ELECTRICAL ENGINEERING SAFETY – GUIDE TO THE MINE HEALTH AND SAFETY REGULATION 2007 AND OCCUPATIONAL HEALTH AND SAFETY REGULATION 2001

Relevance of Standard

Provides details of MINE SAFETY OPERATIONS expectations of the Electrical engineering Safety content of a Mine Safety Management Plan. It encompasses all the legislative requirements.

Application by Industry

Mine Safety Management Plans address Electrical Engineering Safety by complying as a minimum to EES013

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|---------------------------------|-----------------------------|----------|---------------------------------|---------------------------------|
| SIEE Waudby | IEE, MSAC, EISAC, & EE Meetings | Any / all electrical staff. | SIEE | Correspondence, meeting minutes | IEE, MSAC, EISAC, & EE Meetings |



Standards and Guidelines Program for Electrical Engineering Safety

RISK MANAGEMENT & CLASSIFICATION OF HAZARDOUS AREAS

Relevance of Standard

Provides details of classification of hazardous areas using risk assessment techniques

Application by Industry

Mine surface hazardous area classification

Process for determining underground hazardous areas not specified by legislation.

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|-------------------------------|-----------------------------|----------|----------------------------------|---------------------------|
| SIEE Waudby | Australian Standard committee | Any / all electrical staff. | SIEE | Correspondence , meeting minutes | IEE, CSAC, MSAC and EISAC |

TECHNICAL REFERENCE ELECTRICAL ENGINEERING SAFETY EES008.5 – LIFE-CYCLE MANAGEMENT OF POWERED WINDING SYSTEMS (DRAFT)(MDG2005)

Relevance of Standard

Provides requirements for the life-cycle management of Powered Winding Systems at U/G mines (coal and metals). It has links to EES008 and functional safety standards.

Application by Industry

U/G mines (coal and metals) to have life-cycle management systems that comply with the technical reference.

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|-----------------|-------------------------------------|--------------------------------------|----------|----------------------------------|------------------------------------|
| SIEE J F Waudby | IEE meeting, CSAC, MSAC EE Meetings | Any / all electrical staff. Industry | SIEE | Correspondence , meeting minutes | IEE meeting CSAC, MSAC EE Meetings |

TECHNICAL REFERENCE ELECTRICAL ENGINEERING SAFETY EES003 - PRACTICES FOR THE LIFE-CYCLE MANAGEMENT OF EXPLOSION PROTECTED EQUIPMENT

Relevance of Standard

Provides requirements for the life-cycle management of Ex equipment at U/G coal mines. It has links to key hazardous area standards, hazardous area competencies and workshop licensing.

Application by Industry

U/G coal mines to have management systems that comply with the technical reference.

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|--------------------|--------------------------------|--------------------------------------|----------|----------------------------------|------------------------------|
| MSO-EE P De Gruchy | IEE meeting, CSAC, EE Meetings | Any / all electrical staff. Industry | SIEE | Correspondence , meeting minutes | IEE meeting CSAC EE Meetings |



Standards and Guidelines Program for Electrical Engineering Safety

TECHNICAL REFERENCE ELECTRICAL ENGINEERING SAFETY EES011 – TECHNICAL PRINCIPLES FOR THE DESIGN OF ELECTRICAL SYSTEMS

Relevance of Standard

Provides principles for electrical installations at all mines, from distribution systems to control circuit design, within a contemporary OH&S framework.

Application by Industry

ALL mines to have installations and plant that comply with the technical reference.

MINE SAFETY OPERATIONS Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|---|--------------------------------------|-----------------|----------------------------------|--|
| SIEE Waudby | IEE meeting, CSAC, MSAC, EISAC, EE Meetings | Any / all electrical staff. Industry | Electrical team | Correspondence, meeting minutes. | IEE meeting CSAC, MSAC, EISAC, EE Meetings |



Competency of people (engaged in electrical equipment and systems throughout the life cycle.)

IMPORTANT INDUSTRY STANDARDS

Mine Electrical Engineers Certificate of Competence

EES002 Technical Reference Electrical Engineering Safety Control and Supervision of Electrical Work

AS/NZS 4761 (Hazardous area competencies)

EES 012 Technical Reference for the Assessment and Registration of Competency - Cable Repairer For reeling, trailing and flexible cables used in NSW Underground Coal Mines

MITAB Competencies (Mine Electrical Engineers)

NUITAB Competencies

MINE ELECTRICAL ENGINEERS CERTIFICATE OF COMPETENCY

Relevance of Standard

Provides minimum requirements to qualify for examination in the qualification Certificate of Competency, Mine Electrical Engineer

Application by Industry

All U/G coal mines must employ a Manager of Electrical Engineering with this qualification.

All O/C mines must consult with a qualified engineer.

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|--|-----------------------------|----------|----------------|--------------|
| IEE Bentham | Coal Competency Board and public comment process | Any / all electrical staff. | SIEE | Correspondence | IEE meeting |

EES001 – ELECTRICAL ENGINEERING MANAGEMENT PLAN (EEMP)

EES013 – ELECTRICAL ENGINEERING SAFETY – GUIDE TO THE MINE HEALTH AND SAFETY REGULATION 2007 AND OCCUPATIONAL HEALTH AND SAFETY REGULATION 2001

Relevance of Standard

The aim of the competency parts of these references is to provide the mining industry with a set of safety measures that can be incorporated into the Electrical Engineering Management Plan, to align electrical work practices with those that are regulated in non mining settings (Note: Industry in general has considered electrical work to be “special” and with the potential to contribute to death and injuries in the community if the electrical work is not done properly. For this reason electrical workers are required to be trades qualified and licensed.).



Standards and Guidelines Program for Electrical Engineering Safety

The object is to ensure the safety of electrical installations at mines by nominating minimum standards and procedures for electrical installation work and testing of that work; and requirements for the maintenance of electrical installations.

Electrical installations at mines should be designed by qualified electrical engineers with relevant experience in the mining industry.

Electrical work is considered to be specialist work. It is therefore necessary to ensure that any electrical work is carried out by competent qualified people.

These measures aim to protect life and property from the potential dangers of electricity and to provide written certification of electrical safety to operators of coal operations where work is carried out on an electrical installation by employees or contractors.

Application by Industry

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|---------------------------------|-----------------------------|----------|----------------|--------------|
| SIEE Waudby | IEE, CSAC, MSAC, EISAC meetings | Any / all electrical staff. | SIEE | Correspondence | IEE meeting |

AS/NZS 4761 (HAZARDOUS AREA COMPETENCIES)

AS/NZS 4761.1 Competencies for working with electrical equipment for hazardous areas (EEHA) - Competency Standards

AS/NZS 4761.2 Competencies for working with electrical equipment for hazardous areas (EEHA) - Guide to assessing competency.

Relevance of Standard

Provides minimum requirements for competencies to undertake any of the life-cycle activities related to Ex equipment.

Application by Industry

Electrical staff at mines working on any of the life-cycle activities associated with Ex equipment must have the relevant competencies (hazardous area competencies).

Hazardous area competencies must be integrated into mine OH&S plans and the EEMP.

Workshops that repair and overhaul All U/G coal mines must employ competent persons with the relevant hazardous area competencies. A competent person in a workshop has defined responsibilities – refer AS/NZS3800.

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|--|-----------------------------|--------------|-----------------------------------|--------------|
| IEE Maginnis | Australian Standard P-012 committee work | Any / all electrical staff. | IEE Maginnis | Correspondence and committee work | IEE meeting |

IECEX Scheme for Personnel Competency – refer to the Industry Infrastructure program

Competencies for working with electrical equipment for hazardous areas (EEHA) - Competency Standards, and assessment

Relevance of Standard

Provides minimum requirements for competencies to undertake any of the life-cycle activities related to Ex equipment and to be Certified pursuant to the IECEx System.

Application by Industry



Standards and Guidelines Program for Electrical Engineering Safety

Electrical staff at mines working on any of the life-cycle activities associated with Ex equipment must have the relevant competencies (hazardous area competencies) – with globalisation, international competencies will take on more significance.

Hazardous area competencies must be integrated into mine OH&S plans and the EEMP.

Workshops that repair and overhaul All U/G coal mines must employ competent persons with the relevant hazardous area competencies. A competent person in a workshop has defined responsibilities – refer AS/NZS3800 – with globalisation, international competencies will take on more significance and the adoption of IEC60079.19 will promote this globalisation

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|-----------------------------------|-----------------------------|-------------|-----------------------------------|--------------|
| SIEE Waudby | Australian Standard ET-006-1 work | Any / all electrical staff. | SIEE Waudby | Correspondence and committee work | IEE meeting |

EES012 TECHNICAL REFERENCE FOR THE ASSESSMENT AND REGISTRATION OF COMPETENCY - CABLE REPAIRER FOR REELING, TRAILING AND FLEXIBLE CABLES USED IN NSW UNDERGROUND COAL MINES

Relevance of Standard

Flexible mining cables are of a special construction and use special materials. The repair of such cables is highly specialised work requiring specific competencies. This technical reference provides minimum requirements for competencies to undertake repair, inspection and testing of flexible mining cables used in hazardous zones.

Application by Industry

Underground coal mines are required to have flexible cables repaired at a licensed facility, which in turn requires the work to be done or oversighted by a competent cable repairer.

Many open cut mine and underground metalliferous cables are similar in construction and materials to underground coal mine cables. Safe repair requires special competencies.

Cable repair competencies must be integrated into mine OH&S plans and the EEMP.

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|-------------------------------------|-----------------------------|-------------|---------------------------------|-------------------------|
| SIEE Waudby | Through IEE Cable Repairers meeting | Any / all electrical staff. | SIEE Waudby | Correspondence and meeting work | Cable repairers Meeting |

MITAB COMPETENCIES (MINE ELECTRICAL ENGINEERS)

Relevance of Standard

Could eventually replace the requirement for statutory examination for the Certificate of Competence, Mine Electrical Engineer

Application by Industry

All U/G coal mines must employ a Manager of Electrical Engineering with this qualification.

All O/C mines must consult with a qualified engineer.



Standards and Guidelines Program for Electrical Engineering Safety

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|---------------|-----------------------------|-------------|----------------|--------------|
| IEE Bentham | Through MITAB | Any / all electrical staff. | IEE Bentham | Correspondence | IEE meeting |

NUITAB COMPETENCIES

Relevance of Standard

National Utilities competencies, covers electrical work in specific industrial situations and general electrical competencies applied to all industries.

Application by Industry

Many competencies required to do electrical work at mines are covered by NUITAB competencies.

Mine Safety Operations Process

| Representative | Input | Input Initiator | Input to | Input method | Review Point |
|----------------|----------------|-----------------------------|----------|----------------|----------------------|
| None | Through NUITAB | Any / all electrical staff. | NUITAB | Correspondence | IEE meeting – ad hoc |



Fit for Purpose (FFP) electrical equipment (refer

Table 1)

The principle standard is AS/NZS3000 – Wiring rules. It is a fundamental minimum requirement for surface installations and parts of it are applicable in underground installations. However, due to the nature of mining it may not be sufficient to achieve a tolerable and ALARP risk. As such, AS/NZS3000 must be used in conjunction with many other standards to provide for Fit for purpose electrical installations and equipment. Fit for purpose (FFP) electrical equipment and installations specifically include:

- Electrical protection
- Earthing and lightning protection
- Electrical equipment (cables and apparatus) in non hazardous areas
 - HV
 - LV
 - ELV
- Machine (M/C) Control circuits
 - Functional safety
 - Field devices = ELV
- Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring)
 - HV
 - LV
 - ELV
- Signage

There are a multitude of equipment standards and system standards that cover the above matters, many of them applying to general industry as well as mining. The industry standards identified for Mine Safety Operations involvement are given in Table 1. These standards relate to the essential fit for purpose equipment risk controls as identified.

Safe Procedures (Refer Table 2)

- Hazardous zone classification and identification
- Removal/restoration of power procedures
- Isolation procedures
- Electrical testing procedures
- Electric welding procedures
- Electric shock and burn protocols
- Use of portable apparatus U/G (underground)
- Use of remote controlled equipment
- High Voltage procedures
- Work near overhead lines



**Table of Industry Standards
Fit for Purpose Equipment
Table 1**



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|--------------|-----------------------------------|--|---|
| EL-01 | AS/NZS3000 & associated standards | Wiring rules for ALL electrical installations | Fit for purpose (FFP) electrical equipment and installations specifically includes: <ul style="list-style-type: none"> ➤ Electrical protection ➤ Earthing ➤ Normative other standards ➤ Electrical equipment (cables and apparatus) in non hazardous areas, HV, LV, ELV ➤ Machine Control – Emergency switching requirements ➤ Electrical equipment (cables & apparatus) in a hazardous zone. ➤ Signage ➤ Testing |
| EL-03 | AS1972 | Electric cables - Underground coal mines - Other than reeling and trailing | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-03 | AS1802 | Electric cables - Reeling and trailing - For underground coal mining purposes | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-03 | AS2802 | Electric cables - Reeling and trailing for mining and general use (other than underground coal mining) | Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-03 | AS1747 | Reeling, trailing and feeder cables used for mining - Repair, testing and fitting of accessories | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-03 | Handbook | U/G cable management practices | Electrical equipment (cables and apparatus) in non hazardous areas. Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) |



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|--------------|------------------------|--|---|
| | | | <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-014 | Main Committee | Coordinate all hazardous area work undertaken by Standards Australia. | <ul style="list-style-type: none"> ➤ EL-014 – Equipment for hazardous areas ➤ EL-023 – Equipment for coal mines ➤ MS-011 – Classification of hazardous areas ➤ P-008 – Management Committee ANZEx Scheme ➤ ET-006-01 – Management Committee (Australia) IEC Ex Scheme ➤ P-012 – Hazardous area competencies |
| EL-014 | AS 1826 | Electrical equipment for explosive atmospheres - Special protection - Type of protection s | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-014 | AS/NZS 3800 | Electrical equipment for explosive atmospheres - Overhaul and repair | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-014 | 60079.14 & 60079.17 | Explosive atmospheres – Part 14 Electrical installations design, selection and erection Explosive atmospheres – Part 17 Electrical installations inspection and maintenance | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-014 | 60079.19 | Overhaul and repair | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-014 | AS/NZS 61779 Parts 1-6 | Electrical apparatus for the detection and measurement of flammable gases – <ul style="list-style-type: none"> ➤ General requirements and test methods ➤ Performance requirements for group I apparatus indicating a volume fraction up to 5% methane in air | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|--------------|------------------------|--|---|
| | | <ul style="list-style-type: none"> ➤ Performance requirements for group I apparatus indicating a volume fraction up to 100% methane in air ➤ Guide for the selection, installation, use and maintenance of apparatus for the detection and measurement of flammable gases | |
| EL-014 | IEC 31/387/NP | Equip in explosive atmospheres in mines Issue: Need to monitor closely | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-014 | AS/NZS60079 Parts 0-35 | Electrical apparatus for explosive gas atmospheres <ul style="list-style-type: none"> ➤ General requirements ➤ Flameproof enclosure (d) ➤ Intrinsic safety 'i' ➤ Pressurized enclosures (p) ➤ Intrinsically safe systems ➤ Fieldbus intrinsically safe concept (FISCO) ➤ Powder filling 'q' ➤ Oil-immersion 'o' ➤ Increased safety (e) ➤ Functional safety of fixed gas detecting systems ➤ Miners cap lights | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-014 | HB13 | Electrical equipment for hazardous areas | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|--------------|----------------------------|--|--|
| EL-O17 | IEC60204, Parts 1-11 | Safety of machinery - Electrical equipment of machines ➤ General requirements - LV Machines ➤ HV Machines | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits ➤ Functional safety ➤ Field devices = ELV Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) ➤ HV ➤ LV ➤ ELV Signage |
| EL-017 | IEC62061 | Functional safety of machines | Machine (M/C) Control circuits ➤ Functional safety |
| EL-023 | AS/NZS 2081, Parts 1-7 | Electrical equipment for coal and shale mines - Electrical protection devices – ➤ General requirements ➤ Earth-continuity monitoring devices ➤ Earth-leakage protection systems for use on earth-fault current limited systems (IT systems) ➤ Lockout earth-fault protection devices ➤ Earth-fault limiters ➤ Neutral monitors ➤ Interrupter monitors | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits ➤ Functional safety ➤ Field devices = ELV Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) ➤ HV ➤ LV ➤ ELV |
| EL-023 | AS/NZS4871, Parts 1 – 6 | Electrical equipment for coal mines, for use underground – ➤ General requirements ➤ Distribution, control and auxiliary equipment ➤ Substations ➤ Mains powered electrical mobile equip ➤ Battery powered electrical mobile equip ➤ Wiring of diesel engine machines | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits ➤ Functional safety |



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|--------------|---------------------|--|--|
| | | | <ul style="list-style-type: none"> ➤ Field devices = ELV Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-023 | Handbook | HV practices at mines | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV Signage Isolation, locking and permit to work systems – AS2467 Competencies and supervision of HV switching |
| EL-023 | Handbook | Repair of haz area equipment | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-023 | AS4242 | Earth-moving machinery and ancillary equipment for use in mines - Electrical wiring systems at extra-low voltage | <ul style="list-style-type: none"> ➤ Electrical equipment (cables and apparatus) in non hazardous areas. |
| EL-023 | AS1299 | Electrical equipment for coal mines - Flameproof restrained plugs and receptacles | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-023 | AS1300 | Electrical equipment for coal mines - Bolted flame-proof cable coupling devices | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-023 | AS2290, PARTS 1 & 3 | Electrical equipment for coal mines - Maintenance and overhaul – <ul style="list-style-type: none"> ➤ Maintenance of electrical equipment for hazardous areas ➤ Maintenance of gas detecting and | Electrical apparatus in a hazardous zone (includes gas monitoring). Testing requirements and intervals for 2081 devices. |



TEST BEFORE YOU TOUCH
 NO LIVE LINE WORK



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|--------------|---|---|--|
| | | monitoring equipment | |
| EL-023 | AS/NZS4240 | Remote Controls for Mining Equipment | Machine (M/C) Control circuits <ul style="list-style-type: none"> ➤ Functional safety ➤ |
| EI-023 | AS3007, Parts 1-5 | Electrical installations - Surface mines and associated processing plant <ul style="list-style-type: none"> ➤ Scope and definitions ➤ General protection requirements ➤ General requirements for equipment and ancillaries ➤ Additional requirements for specific applications ➤ Operating requirements | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits <ul style="list-style-type: none"> ➤ Functional safety ➤ Field devices = ELV Signage |
| EL-023 | AS/NZS 62013, Parts 1 & 2 (60079.35, parts 1 & 2) | Caplights for use in mines susceptible to firedamp - General requirements <ul style="list-style-type: none"> ➤ Construction and testing in relation to the risk of explosion ➤ Performance & other safety matters | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-024 | AS/NZS1768 | Lightning | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) & non-hazardous zone <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-025 | AS/NZS1020 | The control of undesirable static electricity | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| EL-049 | AS/NZS61010 Parts 1 -32 | Safety requirements for electrical equipment for measurement, control and laboratory use <ul style="list-style-type: none"> ➤ General requirements ➤ Safety requirements for hand-held probe assemblies for electrical measurement and test ➤ Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement | ➤ Electrical equipment (cables and apparatus) in non hazardous areas. |
| Mine Safety | Safe Mining | Energy Section and plant section | Electrical protection |



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|-----------------|----------------------------|---|--|
| Ops | Handbook | | Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits <ul style="list-style-type: none"> ➤ Functional safety ➤ Field devices = ELV Signage |
| Mine Safety Ops | Opal Miners Handbook | Electricity section | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ LV ➤ ELV |
| Mine Safety Ops | EES005 | Electrical protection and earthing | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits <ul style="list-style-type: none"> ➤ Functional safety ➤ Field devices = ELV Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| Mine Safety Ops | EES007 | Licensing of Cable repair Facilities | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| Mine Safety Ops | EES008.1 (DRAFT) (MDG2005) | Technical reference for the design of powered winding systems – general requirements and registration | Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits |



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|-----------------|----------------------------|--|---|
| | | | <ul style="list-style-type: none"> ➤ Functional safety ➤ Field devices = ELV ➤ Signage |
| Mine Safety Ops | EES008.2 (DRAFT) (MDG2005) | Technical reference for the design of powered winding systems – Definitions and winder types | Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits <ul style="list-style-type: none"> ➤ Functional safety ➤ Field devices = ELV ➤ Signage |
| Mine Safety Ops | EES008.3 (DRAFT) (MDG2005) | Technical reference for the design of powered winding systems – A prescriptive approach | Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits <ul style="list-style-type: none"> ➤ Functional safety ➤ Field devices = ELV ➤ Signage |
| Mine Safety Ops | EES008.3 (DRAFT) (MDG2005) | Technical reference for the design of powered winding systems – A functional safety approach | Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits <ul style="list-style-type: none"> ➤ Functional safety ➤ Field devices = ELV ➤ Signage |
| Mine Safety Ops | EES011 | Technical reference for the technical principles for the design of electrical systems | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV Machine (M/C) Control circuits <ul style="list-style-type: none"> ➤ Functional safety ➤ Field devices = ELV Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV |



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|-----------------|--------------|--|--|
| | | | <ul style="list-style-type: none"> ➤ LV ➤ ELV |
| Mine Safety Ops | EES014 | Technical Principles for the Use of “Stand Alone” Generators at NSW Mines (Coal and Metals) and Extractives Operations | Electrical protection Earthing and lightning protection Electrical equipment (cables and apparatus) in non hazardous areas <ul style="list-style-type: none"> ➤ LV ➤ ELV |
| Mine Safety Ops | GNC-010(B) | Licensing of Ex facilities – application form (includes specific requirements) | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |
| Mine Safety Ops | GNC-010(C) | Licensing of Cable Repair facilities – application form (includes specific requirements) | Electrical equipment (cables & apparatus) in a hazardous zone (includes gas monitoring) <ul style="list-style-type: none"> ➤ HV ➤ LV ➤ ELV |



Table of Industry Standards
Safe Procedures
Table 2



Standards and Guidelines Program for Electrical Engineering Safety

| Committee No | Standard No. | Subject | Essential FFP Equipment risk control |
|-----------------|------------------------------------|--|--|
| EL-014 | AS/NZS 2430, Parts 1 & 3.1 – 3.9 - | Classification of hazardous areas <ul style="list-style-type: none"> ➤ Gas atmospheres ➤ Specific occupancies Classification of hazardous areas - Examples of area classification <ul style="list-style-type: none"> ➤ General ➤ Flammable liquids ➤ Flammable gases | ➤ Hazardous zone classification |
| EL-014 | AS/NZS 60079.10 | Electrical apparatus for explosive gas atmospheres – Classification of hazardous areas | ➤ Hazardous zone classification |
| EL-023 | Handbook | HV Practices for mines | ➤ High Voltage Work Practices |
| EL-044 | AS/NZS 4836 | Safe working on low-voltage electrical installations | ➤ Isolation procedures ➤ Electrical testing procedures |
| EL-049 | HB187 | Selection of electrical test instruments | ➤ Electrical testing procedures |
| Mine Safety Ops | MDG25 | Safe cutting and welding for mines | ➤ Electric welding procedures. |
| Mine Safety Ops | EES006 | Removal and restoration of power | ➤ Removal/restoration of power procedures |
| Mine Safety Ops | EES004 | Portable apparatus | ➤ Use of portable apparatus underground procedures |
| Mine Safety Ops | MDG5002M | Use of remote controlled mining equipment – Underground Metals | ➤ Remote control equipment use procedures |
| Mine Safety Ops | MDG5002C | Use of remote controlled mining equipment – Underground Coal | ➤ Remote control equipment use procedures |
| Mine Safety Ops | Safe Mining Handbook | Energy Section and Plant section | <ul style="list-style-type: none"> ➤ Hazardous zone classification ➤ Removal/restoration of power procedures ➤ Isolation procedures ➤ Electrical testing procedures ➤ Electric welding procedures. ➤ Electric Shock and Burn protocols ➤ Remote control equipment use procedures ➤ High Voltage Work Practices |



Industry Standards

Issues to consider in future revisions

Table 3



Standards and Guidelines Program for Electrical Engineering Safety

| Number / Title | Issues |
|---|---|
| EES001 Electrical Engineering Management Plan | Include radiation requirements. Include electrical requirements for shotfiring (include PES systems and stray currents) Electrical matters for misfires. Earthing and lightning protection of magazines. Utilise “supply abolishment” notices Utilise ‘supply disconnect” notices Safe work on batteries Security of electrical infrastructure against unauthorised access and theft |
| EES003 Management of Explosion protected equipment | |
| EES004 Practices for Portable Electrical Apparatus | No use of double insulated (Class II) tools in wet or damp areas. Hierarchy of risk controls – cordless tools preferred. Example of manufacturer’s instructions. Consider reference to HB282 (HV Handbook) Include hand cranked meggers |
| EES 005 Electrical Protection and Earthing | Arc flash Arc blast hazards 10mA E/L Lightning detection systems |
| EES006 Removal and Restoration of power | Include shotfiring considerations |
| EES007 Licensing of Cable Repair Workshops | Update re plugs and receptacles and overhaul, inspection, repair of plugs, sockets and glands – AS/NZS3800 Consistency and clarity. Consistent with regs (coal and OH&S) |
| EES008.1 Design of Powered Winding Systems. Electrical Engineering Safety – General Requirements & Registration | Electrical Engineering Management Functional safety Prescriptive Registration requirements – documentation, independent assessment |
| EES008.2 Design of Powered Winding Systems. Electrical Engineering Safety – Definitions and Winder Types | Definitions and examples |
| EES008.3 Design of Powered Winding Systems. Electrical Engineering Safety Requirements – a Prescriptive Approach | Contemporise Include comment from external stakeholders AS4024.1502 Design principles AS4024.1603 Types of switches. Position indicators / overwind switches should be replaceable without re-adjustment. Proximity switches are easily defeated – unless they are smart proximity switches Auxiliary interlocks on contactors need to be at both sides as contactors may be skewed and one side may open with the aux contact still closed etc. Performance Levels (ISO standard) SIL capability Learning’s from the assessment program |
| EES008.4 Design of Powered Winding Systems. Electrical Engineering Safety Requirements – a Functional Safety Approach | Develop from scratch – AS62061 approach with mine winder specific examples. ISO standard and PL’s ABB examples to include |
| EES008-5 Life-Cycle Management of Powered Winding Systems Electrical Engineering Safety | Contemporise |



Standards and Guidelines Program for Electrical Engineering Safety

| | |
|--|---|
| Requirements | |
| EES009-1 HV Longwall requirements | Beltana learning's |
| EES009-2 HV Continuous Miner requirements | USA & Beltana learning's |
| EES – 010 Electrical plant in hazardous zones | Make consistent with gazette notice with more detailed explanation |
| EES011 Technical principles for the design of electrical systems | <p>Include section on equipment rating, including power quality.</p> <p>Include comment on uncertainty of risk – higher the uncertainty the more robust the risk controls must be.</p> <p>Remove mention of exemptions wrt hazardous zones.</p> <p>Include concept of inherently safe design</p> <p>10mA E/L</p> <p>ALARP concepts</p> <p>Arc flash – arc blast hazards</p> |
| EES012 Competency of Cable Repairers | Make consistent with the concept of NATA signatories |
| EES013 Technical Ref for Electrical plant and compliance to the MHSAct 2004 & MHS Reg 2007 | <p>Review in 12 months.</p> <p>Suitability to plug & play 415V plug and/or freestanding generators.</p> <p>Safe work on batteries</p> <p>Security of electrical infrastructure against unauthorised access and theft</p> <p>Opal Miners Version.</p> |
| EES014 Technical Reference for the use of Generators | <p>Review and publish as a technical reference – Mines and Opal Mines.</p> <p>Photographs of good and bad required.</p> <p>Consistency with Electrical Safety Legislation for non-mining industry.</p> |
| VVVF Drives | <p>Particular issues of:</p> <p>Extraneous currents</p> <p>Operation of electrical protection</p> <p>Earthing arrangements</p> |
| Static Electricity | <p>Identify what resources are needed to quantify the risk in terms of capability to cause an explosion. i.e. is any level of static harmless? The electrical engineering management plan for a coal operation must make provision for the following:</p> <p>the prevention of the ignition of gas by a static electric charge,</p> <p>guidance on how to prevent static charge that could ignite gas. Our advice would be risk based.</p> <p>We would make recommendations to prohibit some, eg unprotected vent tubes, treat some, eg earth the venturi blowers, avoid some eg poly clothing, remove some from the mine after use eg poly wrapping of pallets. We would look at low humidity as increasing the risk</p> <p>Pursue with Thornton research centre (Geoff Slater) for ACARP research grant. Also look at graduate research program</p> |
| E&MES001 Functional Safety and Safeguarding of Mining Plant | <p>Examples of mechanical shutdown systems on DES's</p> <p>Examples of functional safety to winders</p> <p>Relationship between AS62061 and AS4024</p> |
| Workcover OHL CoP | <p>Should be applicable as crane companies work in both mining and non-mining sectors – common practices should apply. Particular mining issues to address are:</p> <p>Management of zones around OHL's – plan of lines on the site and no-go zones – all integrated into the EEMP.</p> <p>Technical issues to consider are:</p> <p>Lever effect, swinging loads, changing drill rods, mining examples of encroachment in safe distances, 10 metre zone, signage and barriers.</p> <p>Refer Minerals handbook</p> |
| Workcover Construction site | Workcover CoP applies to construction zones. Apply across mine-sites |



Standards and Guidelines Program for Electrical Engineering Safety

| | |
|----------------|--|
| Electrical CoP | (AS/NZS3012 is referenced in the CoP). |
| MDG's | Remove specific electrical content and refer to Australian and IEC standards. Key standards are: AS/NZS (IEC) 60204.1 & 11 AS/NZS (IEC) 62061 AS/NZS 4871 AS/NZS 4240 AS 4242 AS 3007 (relevant parts) Winders – refer to MDG5002 EES008 |
| MDG's | Remove specific electrical content and refer to Australian and IEC standards. |

