



NSW DEPARTMENT OF
PRIMARY INDUSTRIES

**Technical Reference
Electrical Engineering Safety
EES004**

**NSW DPI Technical Reference
Practices for Portable Electrical
Apparatus**

***Coal Mine Health and Safety Act 2002
Coal Mine Health and Safety Regulation 2006***

December 2006 (version 1)



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PREFACE

There is a wide range of electrically powered portable apparatus such as tools, computers, palm pilots, measuring instruments and electrical test instruments.

When using such apparatus there are a range of hazards that must be managed and for mains powered apparatus the work environment can easily compromise the safety of such apparatus. Of particular concern is the use on non-explosion protected apparatus in hazardous zones and the use underground of apparatus that is constructed of light metal alloys.

Test instruments used on electrical circuits can only be used by qualified electrical people.

Coal operators can use this Technical Reference to assess the effectiveness of their present arrangements for dealing with portable electrical apparatus and to check that all sources of electrical risk have been identified and dealt with. If coal operators are setting up new SEP's for portable electrical apparatus this Technical Reference can serve as your step-by-step guide to establishing the minimum safety requirements applicable to portable electrical apparatus at coal operations. It sets out minimum requirements for the preparation of standards of engineering practice

The Technical Reference will assist employers, self-employed persons, employees, contractors, and other parties who use portable electrical apparatus.

This Technical Reference will be used by Mine Safety Operations to assess the effectiveness of coal operation arrangements for the management of portable electrical apparatus.

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Chapter 1 Establishment

1.1 Title

This is the DPI Electrical Engineering Safety Technical Reference – Practices for Portable Electrical Apparatus.

1.2 Purpose

This Technical Reference is intended to provide a framework for DPI officers to assess coal operation arrangements for the management of portable electrical apparatus as part of the Electrical Engineering Management Plans. It can also be used by coal operators as guidance material for implementing, managing or reviewing their portable electrical apparatus practices.

This Technical Reference identifies issues required to be addressed to achieve safety measures equivalent or better than those expressed in electricity safety legislation. Some of the aspects included in this document may not be specifically nominated in the current climate of “non-prescriptive legislation” but are relevant and worthy of acceptance in an effort to protect people and property from harmful effects of electricity.

This Technical Reference describes acceptable arrangements that can be tailored to suit the particular needs of an operation. It identifies some of the core hazards, risks and control measures relevant to electrical circuitry. It is intended to protect the safety of workers, others in the workplace and property.

The outcomes sought to be achieved by this Technical Reference are to protect people and property from the risks associated with the use of portable apparatus at coal operations including:

- Electrocutation.
- Electric Shock.
- Electrical burn injuries.
- Arc blast injuries.
- Injuries sustained through operation of the apparatus.
- Unintended operation of the apparatus.
- Ignitions of flammable mixtures of gas or dust.
- Fire.

1.3 Scope

This Technical Reference extends to all coal operations in New South Wales. It covers the selection and use of portable electrical apparatus at all locations in coal operations including surface areas, treatment plants, underground and in hazardous zones. The range of portable apparatus that should be considered includes mains powered, battery powered, explosion



protected, non explosion protected tools, appliances and test instruments. It also includes associated leads, cables, plugs and batteries.

This Technical Reference is supplemented by the following Technical References:

- EES001 NSW DPI Technical Reference – Electrical Engineering Management Plan
- EES002 NSW DPI Technical Reference - Control and Supervision of Electrical Work
- EES003 NSW DPI Technical Reference - Practices for the Life-Cycle of Management of Explosion Protected Equipment
- EES005 NSW DPI Technical Reference - Electrical Protection and Earthing
- EES006 NSW DPI Technical Reference - Removal and Restoration of Power

1.4 Authority

This is an Electrical Engineering Safety Technical Reference and is recommended by the Department of Primary Industries.

1.5 Definitions

Competent person for any task means a person who has acquired through training, qualification, experience or a combination of them, the knowledge and skills to carry out the task.

Plant includes any machinery, equipment or appliance.

Portable apparatus means electrical apparatus capable of being carried manually while it is being used but does not include a caplamp. It covers such items as hand-held portable or transportable welders, portable power tools, appliances and flexible extension cords.

Portable socket outlet assembly is an assembly having a heavy duty sheathed flexible cord, one or more socket-outlets, an overload protection device and a plug intended for connection to a low-voltage socket-outlet. It should also incorporate a residual current device and a reeling or coiling arrangement.

Residual current device (RCD) means a device intended to isolate supply to protected circuits, socket outlets or electrical equipment in the event of a current flow to earth which exceeds a predetermined value.

1.6 Applicable Legislation

The Occupational Health and Safety Act 2000

The Occupational Health and Safety Regulation 2001

The Coal Mine Health and Safety Act 2002

The Coal Mine Health and Safety Regulation 2006



1.7 Referenced Gazette Notices

Gazette Notice for Specification of Plant that can be used in a Hazardous Zone

Gazette Notice for the conditions of use of non-Explosion protected plant in a hazardous zone

1.8 Referenced Standards and Guidelines

AS/NZS 2290.1: Electrical equipment for coal mines - Introduction and maintenance - For hazardous areas

AS/NZS 2381 Series - Electrical equipment for explosive gas atmospheres - Selection, installation and maintenance

AS/NZS 3000: Electrical installations (known as the Australian/New Zealand Wiring Rules)

AS/NZS 3012 Electrical installations—Construction and demolition sites

AS 3111 Approval and test specification - Miniature overcurrent circuit-breakers

AS/NZS 3112 Approval and test specification - Plugs and socket-outlets

AS/NZS 3123 Approval and test specification - Plugs, socket-outlets and couplers for general industrial application

AS/NZS 3190 Approval and test specification - Residual current devices (current-operated earth-leakage devices)

AS/NZS 3191 Electric flexible cords

AS 3439.4 Low-voltage switchgear and controlgear assemblies - Particular requirements for assemblies for construction sites (ACS)

AS/NZS 3760 In-service safety inspection and testing of electrical equipment

AS/NZS 3800 Electrical equipment for explosive atmospheres - Repair and overhaul

AS/NZS 4898 Approval and test specification - Circuit-breakers for overcurrent protection for household and similar installations

AS 4836 Safe working on low-voltage electrical installations

AS/NZS 60079 Series - Electrical apparatus for explosive gas atmospheres

AS 60529:2004 Degrees of protection provided by enclosures (IP Guideline),



IEC 60309 Plugs, socket-outlets and couplers for industrial purposes - Part 1: General requirements

EES001 NSW DPI Technical Reference Electrical Engineering Management Plan.

EES003 NSW DPI Technical Reference Practices for the Life-Cycle Management of Explosion Protected Equipment

HB187 Guide to Selecting a Multimeter

MDG1029 Guidelines for Agency Coordination During Body Recovery at NSW Mines

1.9 Acronyms

AS – Australian Standard

AS/NZS – Australian New Zealand Standard

ELV – Extra Low Voltage

Ex – Explosion protected

IEC – International Electrotechnical Commission

SEP – Standard of Engineering Practice



Chapter 2 Commonly encountered environments at coal operations



Environments may increase the hazards associated with a particular task. The range of environments should be considered for each potential work activity.

2.1 Operating Environments

When preparing a SEP for portable electrical apparatus the range of operating environments at a coal operation should be identified. AS 4836 describes situations with increased risk as situations that may increase the risk of electric shock or severe injury including cramped working conditions, multiple sources of supply, damp situations, heat, height or operational pressures to carry out work quickly. The following examples of operating areas have already been identified in Australian Standards.

2.1.1 NON ELECTRICALLY HAZARDOUS

Areas that are clean, dry, well lit, plenty of room, even flooring, insulated flooring.

2.1.2 ELECTRICALLY HAZARDOUS

Areas that include damp, dust, other contaminants that increase the risk of electric shock or equipment faults, heat (causing perspiration), humidity, height, reduced lighting, reduced visibility, heavy industrial conditions, heavy parts and materials handling, moving traffic,

2.1.3 HAZARDOUS AREAS

Areas where an explosive atmosphere may be present as defined in AS/NZS 60079.10 or as defined in the Coal Mines Health and Safety Act 2002.

2.1.4 CONFINED SPACES

Areas including:

- Storage tanks, process vessels, boilers, pressure vessels, silos, and other tank like compartments.
- Open topped spaces such as pits and degreasers.
- Pipes, sewers, shafts, ducts, and similar structures.

Note: there are specific regulatory provisions for entry into confined spaces, not covered in this Technical Reference.

Having identified hazards the next step is your risk assessment which will then consider the likelihood and how serious a problem each hazard could create.



Chapter 3 Common hazards encountered with portable electrical apparatus

3.1 Common electrical hazards which may be encountered while using portable electrical apparatus



Below are examples of typical sources of hazard that, individually or in combination, could lead to ignition, electric shock or severe injury. The list is not in order of priority.

- Voltages between phases.
- Voltages between phases and earth.
- Voltages between live exposed conductors and surrounding metal framework.
- Voltages across undischarged capacitors.
- Voltages on disconnected conductors - particularly neutrals.
- Voltages on the output of welders and gougers.
- Multiple supply sources (more than one source of supply or live circuit may be available on the premises).
- Voltages between live exposed conductors and the surrounding environment (including metalwork, damp situations, other conductive surfaces and persons nearby).
- Electrical testing or operating equipment in hazardous areas.
- Lower voltages - for example ELV may be hazardous in a cramped situation with dampness, heat or water on the floor, especially when the worker is lying on the floor.
- Damp conditions.
- Switched off circuits becoming live.
- Induced voltages.
- Unplanned operation or movement due to a fault condition.



Examples of work involving common hazards

Hazard	Work activity
<i>Electrical energy produced by the voltage between phases</i>	<ul style="list-style-type: none"> • Using polyphase portable apparatus. • Handling energised polyphase cables. • Connecting polyphase portable apparatus to fixed wiring or outlets. • Testing / faultfinding polyphase portable apparatus or cables.
<i>Electrical energy produced by the voltage between phases and earth</i>	<ul style="list-style-type: none"> • Using single or polyphase portable apparatus. • Handling energised single or polyphase cables. • Connecting single or polyphase portable apparatus to fixed wiring or outlets. • Testing / faultfinding single or polyphase portable apparatus or cables.
<i>Electrical Sparking energy in hazardous areas</i>	<ul style="list-style-type: none"> • Operating mains or battery powered portable apparatus in a hazardous area. • removing or replacing batteries on battery powered portable apparatus in a hazardous area.
<i>Thermal energy in hazardous areas</i>	<ul style="list-style-type: none"> • Operating mains or battery powered portable apparatus in a hazardous area.
<i>Thermal energy in the presence of flammable materials</i>	<ul style="list-style-type: none"> • Operating mains or battery powered portable apparatus where coal dust layering may be present.
<i>Damp working conditions</i>	<ul style="list-style-type: none"> • Working in situations where condensation, spillage, drainage or seepage occurs and results in wet surroundings.
<i>Kinetic energy</i>	<ul style="list-style-type: none"> • Unexpected operation of portable apparatus.



3.2 Common non-electrical hazards which may be encountered while using portable electrical apparatus



Other hazards which may contribute to risks while carrying out electrical work include:

- Confined spaces (where there may be a hazardous atmosphere - see below).
- Lack of sufficient light to work safely.
- Lack of ventilation leading to uncomfortable, hot and humid working conditions.
- Excessive fatigue due to pressure of deadlines or other factors.
- Obstacles to getting the equipment switched off.
- Using a gas flame near exposed electrical conductors (a flame is a conductor).
- Temperature rise as a result of combustion.
- Fall from heights.
- Cramped working conditions.
- Explosive atmospheres.
- Static from clothing made from wool, wool blends, nylons and polyvinyl (unless treated with an anti static process).
- Electric tools and equipment (e.g. hand lamps, drills, saws, torches and test instruments).
- Personal effects (e.g. rings, jewellery, cigarette lighters, matches, hearing aids, mobile phones and pagers, transistor radios and similar).
- General work activities (e.g. welding, cutting, brazing, using hand saws, drilling of all types, hammering and chiseling).
- Static from the rubbing (friction effects) of plastics.
- Hot metal surfaces due to drilling, grinding welding, etc.
- Use of metallic tape measures.
- Excavation associated with electrical work.
- Molten metal from arcs.



Chapter 4 Risk factors associated with portable electrical apparatus

4.1 Operating mains powered portable electrical apparatus

Examples of common risk factors when operating portable apparatus include:

The apparatus has a fault or damage that allows contact with live parts.

The supply cable or extension lead has a fault or damage that allows contact with live parts.

The apparatus or cable has a fault or damage that causes metal parts of the apparatus to become live.

The apparatus has a fault or damage that causes a short circuit between power conductors, releasing energy in an arcing fault.

Automatic starting of machinery after supply is restored.

Lack of information about limitations that should be applied to the use of the apparatus.

4.2 Using portable electrical apparatus in an electrically hazardous environment

Moisture is permitted to enter Class II apparatus causing a current path to the operator.

Conductive dust or solids (e.g. flyings) enter Class II apparatus causing a current path to the operator.

4.3 Taking portable electrical apparatus underground

Battery powered portable apparatus may be inadvertently taken into a hazardous area.

Leads and cables may become damaged by heavy equipment.

The apparatus may produce a hot surface capable of igniting layered coal dust.

The apparatus may produce sparks capable of igniting flammable materials.

Apparatus with exposed light metal parts could produce incendive effects capable of igniting flammable materials.

4.4 Taking portable electrical apparatus into a hazardous area.

Apparatus may produce sparks or thermal effects in normal use that could ignite an explosive atmosphere.

Apparatus may produce sparks or thermal effects under fault conditions that could ignite an explosive atmosphere.

Apparatus may produce sparks or thermal effects under conditions of misuse (e.g. changing a battery) that could ignite an explosive atmosphere.



Chapter 5 Controlling Risks

5.1 Management System for Portable Apparatus



The *Coal Mine Health and Safety Act 2002* and Regulation require mine operators to prepare an Electrical Engineering Management Plan, including arrangements for the use of portable apparatus.

Portable apparatus at a coal operation must be subject to SEP's for Portable Electrical Apparatus. In preparing the SEP's the operator should have regard for this Technical Reference.

The SEP's should form part of the coal operation's Electrical Engineering Management Plan, constituted under the coal operation's Occupation Health and Safety Management System, and be subject to the review and audit procedures contained within that system.

5.2 Control measures for all portable electrical apparatus

5.2.1 MULTI-METERS:

Refer to Standards Australia HB187 "Guide to Selecting a Multimeter:

- Shall only be used by qualified electrical persons.
- Shall only be used with detailed procedures.
- Shall only be used in surface locations.
- Shall only be used on ELV or low voltage installations.
- The location of use shall be ergonomically suitable for testing, stationary, well lit, clean, dry, and free of slip, trip and fall hazards.
- Be suitably rated for the circuit (voltage, fault level, frequency of supply) – correct category instrument.
- Shall only be used where curable burn distances can be maintained.
- Used only in locations where inadvertent contact with energised conductors is not possible.
- Shall only be used under appropriate supervisory arrangements.

5.2.2 SELECTION

The SEP should contain criteria for the selection of portable apparatus. All portable apparatus should be fit for purpose and suitable for its intended environment. Selection criteria should be applied at the time of purchase, hiring, letting of a contract, induction of contractors and job planning. Relevant Australian Standards should be used when establishing selection criteria.



Where possible portable apparatus should be used in the area of least risk.

Where portable apparatus is to be used in an area of higher risk then the apparatus should be selected on the basis of its suitability for that area.

Where portable apparatus is to be taken into a hazardous zone, for example, it should be certified as explosion protected and suitable for the intended area.

Where portable apparatus is used in an area of higher risk than its design allows then additional risk controls must be identified and implemented so that equivalent safety is ensured.

The hierarchy of risk controls should be applied in all cases so that use of portable apparatus in a zone of higher risk should only occur when there is no reasonable alternative and sufficient alternate risk controls can be applied.

In the case of a hazardous zone the identified risk controls must have regard for the sudden contamination of an area by a flammable gas mixture, for example in the event of a goaf fall.

The reason for including selection criteria in the SEP is to avoid situations where portable apparatus can be used in situations for which it is unsuitable, exposing the workforce to risk of electrical injury or ignition of explosive atmosphere. Some examples of hazards from unsuitable apparatus are given here:

Situation	Hazard
Class II apparatus without IP rating used in damp areas	Electric Shock
Apparatus with exposed light metal parts underground	Fire from incendive sparking
Apparatus without temperature limitation used underground	Ignition of coal dust
Non Ex apparatus used in hazardous zone	Ignition of methane

5.2.3 MANUFACTURER'S INSTRUCTIONS

Conditions for safe use must be provided by the supplier of the equipment and should be made available to users and followed at all times.

The reason for this requirement is that designers and manufacturers have identified hazards and limitations that apply to their product.

For example many hand held tools are suitable only for clean and dry environments because the ingress of moisture can create an electric shock hazard. The risk to the user is increased if the manufacturer's instructions are not followed. Typical instructions can include "Do not use in a damp area."

Australian Standards require suppliers to provide such instructions. These instructions should be considered during any risk assessment relevant to the SEP.

Workers must be appropriately trained and competent in operating procedures and limitations applying to portable apparatus.



5.2.4 CLASS I, CLASS II AND CLASS III APPARATUS

The SEP should recognise the distinction between Class I, Class II and Class III mains powered portable apparatus. The Class of apparatus is defined in AS 3000:2000 Wiring Rules and is a means of providing protection against indirect contact.

Selection of apparatus of a particular class will be dependant on the intended environment and service conditions of the apparatus.

For example if Class II apparatus is used in a hot, steamy or damp area then ingress of moisture can cause electric shock because Class II appliances are not earthed.

The purpose of this requirement is to protect the user and others in the workplace from the risk of electric shock and unintended operation of the apparatus.

5.2.5 INGRESS PROTECTION

The SEP should recognise the application of Ingress Protection ratings to portable apparatus.

Portable apparatus should only be used in areas compatible with the rated Ingress Protection (IP) of the equipment.

IP ratings are described in AS 60529 and are required to be marked on the equipment name plate.

If there is no IP rating marked on the apparatus then it must be considered to be unprotected and suitable only to be used in clean and dry environments.

The purpose of this requirement is to protect the user and others in the workplace from the risk of electric shock and unintended operation of the apparatus.

5.2.6 INSPECTION AND TESTING

The SEP should include an inspection and testing program as described in AS/NZS 3760 and AS/NZS 3012.

Inspection and testing should be applied to equipment kept at the coal operation as well as contractor and hired equipment.

The program should include an initial inspection to determine the range of environments for which the equipment is suitable.

The purpose of this requirement is to control the risk of introducing hazards through defective or unsuitable equipment.

5.2.7 REGISTER AND RECORDS FOR PORTABLE APPARATUS

A SEP should include a register of all portable apparatus used at the coal operation.

Inspection, testing, maintenance and relevant use records must be kept at the coal operation.

This is a requirement of AS 3760 and AS/NZS 3012 for the purpose of testing and tagging.

The register is also a useful tool for defect management records and record of equipment allowed underground and in the hazardous zone.



5.2.8 CONTROL OF CONTRACTOR EQUIPMENT

The SEP should contain adequate measures for the control of portable apparatus introduced to the site by contractors, consultants and other visitors.

5.2.9 RISK CONTROLS FOR LEADS AND EXTENSION LEADS

The SEP should identify control measures for the safe selection and use of power leads and extension leads.

Replacement of leads and plugs on appliances should be only by a competent qualified electrician and in accordance with the relevant appliance standard.

AS/NZS 3012 contains requirements for leads and portable socket outlet assemblies.

The SEP should include a determination of those parts of the coal operation that have similar characteristics to a construction site and to which AS/NZS 3012 will be applied. Risk controls in those areas should include:

- Prevention of the use of double adaptors and 3-pin plug adaptors (piggyback) and similar fittings.
- Limitation of the length of extension leads and combination of extension leads to avoid a voltage drop and the appliance of greater than 5%.
- Prevention of mechanical damage, damage by liquids or damage by high temperatures occurring to flexible cords and cables.
- Provision of flexible cords and cables with suitable protection against mechanical damage, or protection by location.
- Provision of stands or hangers for flexible cords and cables so that they are supported off the floor or ground. Stands or hangers should be covered with material that is non-conducting and will prevent mechanical damage to the cable.

5.2.10 RISK CONTROLS FOR PORTABLE SOCKET OUTLET ASSEMBLIES

The SEP should identify control measures for the safe selection and use of portable socket outlet assemblies. Where such assemblies are intended to be used in industrial environments at coal operations the following selection criteria should be included in the SEP:

- Compliance with the requirements of a Class H portable residual current device to AS/NZS 3190 or those of a socket-outlet assembly to AS 3439.4.
- Enclosures to be constructed of a suitable impact resistant and durable material and of Class II (double insulated) construction.
- Socket-outlets mounted on the assembly to comply with AS/NZS 3112, AS/NZS 3123 or IEC 60309, and be protected against damage by suitable means such as covers or extended sides and shall have an IP rating appropriate for the environment.
- The flexible cord supplying the assembly to be of the heavy duty sheathed type complying with AS/NZS 3191, shall be of a maximum length of 1.8 m and shall be fitted with a plug complying with AS/NZS 3112, AS/NZS 3123 or IEC 60309.



- The assembly to incorporate overload protection with a rating no greater than the rating of the flexible cord supplying the assembly. Where three or more socket-outlets are fitted to the assembly, overload protection shall be provided by a miniature over-current circuit-breaker complying with AS 3111 or AS/NZS 4898.
- All socket-outlets mounted on these assemblies to be protected by a residual current device with a maximum rated residual current of 30 mA, which operates in all live (active and neutral) conductors.

5.2.11 RISK CONTROLS FOR POWER BOARDS

The SEP should identify control measures for the safe selection and use of power boards.

Current Australian Standards require that power boards incorporate minimum safety requirements including a circuit breaker to prevent overloading if fitted with three or more outlets. Some older models might not incorporate a circuit breaker and should not be used.

Power boards are more prone to damage, contamination and wear and tear than fixed socket outlets because of their portability and upward facing sockets.

Application of the hierarchy of risk controls will indicate the need to install permanent socket outlets in most cases.

Fit for purpose industrial portable socket outlet assemblies with integral RCD protection may be used where installation of fixed outlets is not possible.

The following points should be noted in the SEP.

- Multiple or cascaded power boards should not be used.
- Double adapters should not be used in conjunction with power boards.
- Power boards should be regularly checked for signs of damage or heating and that sockets firmly grip the plug when inserted.
- Power boards should not be used outdoors or in dusty or polluted environments such as workshops and building sites.
- Power boards should not be used in wet areas or areas where there is likely to be water present.
- Power boards that have been subjected to moisture or are in any way damaged should be withdrawn from service.

5.3 Portable Apparatus Underground

Multi-meters for testing for voltages and other electrical circuit parameters should not be used underground in normal circumstances. Occasionally there may be a requirement to use this type of instrument underground but when this is the case it should only be used under the supervision of an electrical engineer and under conditions specified by the manager of electrical engineering.

Under some circumstances police and emergency services may desire to take specific items of portable electrical apparatus underground in accordance with MDG1029 for the purposes of



recovering the bodies of deceased persons. Generally this type of portable apparatus will be special lighting and cameras. This Technical Reference should be applied to this type of equipment.

5.3.1 INSPECTION PRIOR TO USE

The SEP should include provisions requiring that any portable apparatus is inspected by a competent person prior to being taken underground. In addition the inspection should include a process for making a determination of the suitability of the apparatus for use in the intended area. A record showing the results of the inspection and determination should be kept.

The purpose of this inspection is to prevent exposure of personnel to electrical hazards that could arise if unsuitable apparatus is used in a damp, dusty or otherwise arduous environment. The range of hazards can include shock, burns, and unintended operation of the apparatus.

It is also used to identify light metal alloys and materials that may not have anti-static properties. The range of hazards includes gas ignition sources from incendive arcs caused by rusty metal striking light metal alloys and ignition from a static discharge.

It is also used to determine the suitability of battery housings and security of batteries. (Ideally batteries should be within a separate compartment of the apparatus and only be accessible by the use of a tool). The range of hazards includes a battery becoming dislodged and lost in a mine with the potential to be an ignition source or a short circuit causing a battery to explode (lithium batteries are susceptible to this).

The inspection should include an assessment as to whether or not the equipment is explosion protected. This will enable limitations to be imposed on equipment that is not suitable to be taken into the hazardous zone. The purpose of this assessment is to prevent mine workers from being exposed to risk from a gas explosion that could be initiated by sparking or thermal effects from unsuitable apparatus being used.

5.3.2 EXCLUSION OF CERTAIN APPARATUS FROM HAZARDOUS AREAS

Apparatus that is intended to be used in a hazardous area should also meet the requirements in section 5.4. The SEP should include measures to ensure that equipment that is not intended for use in a hazardous zone is not taken into a hazardous area. This should include clear instruction to the user regarding the identification of the boundaries of any hazardous areas at the coal operation.

The purpose of this requirement is to provide secure barriers against the possibility of mineworkers being exposed to risk of gas ignition caused by unsuitable equipment in hazardous areas.

5.3.3 TRANSPORT, CARE AND STORAGE OF APPARATUS

The SEP should include provisions for specifying transport, care and storage of items while underground.

The equipment should be assigned to a responsible officer for its safe transport, care and use while underground.



The SEP should include measures to ensure the responsible office returns the equipment to the surface for inspection and deregistration from the underground equipment register.

Battery powered apparatus should be in the care of a competent person whilst the apparatus is underground. This allows the apparatus to be withdrawn to the surface in the event of a main ventilation failure. The range of hazards includes the battery powered apparatus becoming an ignition source.

5.3.4 INSPECTION AFTER USE

The SEP should include provisions requiring that any portable apparatus that has been taken underground is returned to the surface and inspected for damage.

The SEP should include a provision for making a record of this return and inspection and recording of defects in a defect management system.

The purpose of this requirement is to confirm that equipment taken underground has been returned to the surface.

The purpose of the inspection is to identify equipment and practices that result in damage in service and allow for removal and repair as well as identify equipment that does not stand up to the rigors of underground use.

This will prevent users and other mine workers from being exposed to risks associated with the use of equipment that is not fit for purpose.

5.3.5 ENVIRONMENTAL CONDITIONS

The SEP should have regard for the type of environmental conditions to be encountered underground and the potential for changing conditions due to mining activities, transportation systems and emergency procedures.

Consideration should be given to the arduous physical conditions likely to be encountered and the high risk of physical damage to equipment and, in particular, leads.

5.3.6 EXCLUSION OF ITEMS CONTAINING EXPOSED LIGHT METAL ALLOY PARTS

The SEP should include measures to restrict equipment containing exposed light metal parts from being taken underground.

The purpose of this requirement is to prevent mineworkers from being exposed to the risk of ignition of gas caused by exothermic reaction between light metal alloy and iron oxide (incendive arcing).

5.3.7 EXCLUSION OF ITEMS WITH RISK OF ACCUMULATION OF STATIC CHARGE

The SEP should include measures to ensure apparatus can not accumulate static charge or is in a carry case that has anti-static properties.

The purpose of this requirement is to prevent mineworkers from being exposed to the risk of ignition of gas caused by a discharge of static electricity.



5.3.8 PROCEDURE IN THE EVENT OF A VENTILATION FAILURE OR SUDDEN CONTAMINATION

The SEP should include procedures for the control of portable apparatus in the event of a ventilation failure or sudden contamination of an area by flammable gas, for example a goaf fall.

The purpose of this requirement is to prevent mineworkers from being exposed to risk of ignition of gas due to unexpected changed conditions when there is portable apparatus present that may be capable of causing an ignition.

5.4 Portable Apparatus in a Hazardous Area

5.4.1 SELECTION OF PORTABLE APPARATUS



AS 2381.1 includes requirements regarding selection and installation of portable apparatus in a hazardous area.

Any portable apparatus taken into a hazardous area should be certified as explosion protected and selected with regard to the class, gas group, zone and temperature limitation requirements for the area.

- Refer to the Gazette Notice for Specification of Plant that can be used in a Hazardous Zone
- Refer to EES003 NSW DPI Technical Reference Practices for the Life-Cycle Management of Explosion Protected Equipment

For coal mines where the hazards are methane and coal dust the appropriate certification is for Group I.

Group I apparatus is specifically certified for coal operations and has additional safeguards in the areas of maximum surface temperatures, limitation of incendiary materials, ignition energy, impact ratings, design of fasteners.

In some cases other types of hazardous areas may exist at a coal operation, for example a battery charging area where there may be an explosive mixture of Hydrogen and air in which case equipment would need to be selected to suit that specific area. Refer to AS/NZS 2381.

In certain circumstances it is possible to use non explosion protected equipment in a hazardous area under strict controls as described below.

5.4.2 SPECIFIC REQUIREMENTS FOR NON EXPLOSION PROTECTED EQUIPMENT

If the use of non-explosion protected portable equipment in a hazardous zone cannot be reasonably avoided then:



- Refer to the Gazette Notice for the conditions of use of non-Explosion protected plant in a hazardous zone
- Refer to the Gazette Notice for Specification of Plant that can be used in a Hazardous Zone

If the portable apparatus is not certified for the intended operating area then a gas clearance must be obtained prior to the use of the equipment and remain in force for the entire period that the apparatus is in the hazardous area.

5.4.3 EXAMINATION OF EX CERTIFICATION DOCUMENTATION.

In some cases apparatus may be considered to be certified for use in the hazardous zone. The SEP should include measures for ensuring that the certification and other documents are examined and are included in the verification dossier for the equipment.

The examination of documents should include confirmation that the apparatus is certified for the class, group and temperature limitation for the intended area of use. In addition the certification scheme must be one that is accepted for NSW mines as described in the Gazette Notice for Specification of Plant that can be used in a Hazardous Zone

The examination should include verification that the presented equipment corresponds to the certification documents.

The examination should include a determination of any conditions of installation and use imposed in the certification documents.

The examination should include a determination that the presented equipment conforms to any inspection and overhaul regime imposed on the equipment. Inspection and overhaul requirements are described in AS/NZS 2290 and AS/NZS 3800.

The purpose of this requirement is prevent mine workers from being exposed to the risk of a gas explosion if unsuitable apparatus is allowed to be used in the hazardous zone.

5.4.4 GAS CLEARANCE CERTIFICATE

The SEP should include measures requiring the preparation of a gas clearance certificate prior to the introduction and use of non explosion protected portable apparatus in a hazardous zone.

A competent person should be required to provide a gas clearance certificate before non explosion protected portable apparatus is taken into a hazardous zone.

The certificate should be raised by a competent person after examining all areas within 20 metres of the areas where the apparatus is intended to be used (Note: this includes the equipment being tested, for example a cable, where there is no gas at the point of attachment of the apparatus but there may be gas at the far end of the cable).

The certificate should only be raised if it is shown that the methane concentration in the examined areas is less than 0.5 percent. Regard should be had for the possibility of sudden contamination due to goaf falls and other causes.

The certificate should be signed by the competent person prior to the non explosion protected apparatus being admitted to the hazardous zone.



The competent person should make regular checks for methane during the period that the apparatus is in use and record the results on the certificate.

When the apparatus is removed from the hazardous area the certificate should be closed and signed off by the competent person.

5.4.5 USE OF TEST INSTRUMENTS

The SEP should include measures for dealing with the use of test instruments where there is a possibility that the instrument or the circuit under test may be partially or completely in a hazardous zone.

Any examination for explosive mixture and gas clearance certificate should extend to all areas that include the instrument and circuit under test.

Considerations given to sudden contamination should extend to all areas that include the instrument and circuit under test.

5.4.6 REPORTING OF DEFECTS

The SEP should include measures for the reporting of damage or defects to portable apparatus.

It should be noted that if the damage or defect affects explosion protection properties of the apparatus then it may be a notifiable occurrence under the *Coal Mine Health and Safety Act 2002* and Regulation.



Chapter 6 Feedback Form

Your comments will be very helpful in reviewing and improving this document.

Please copy and complete the Feedback Form and return it to:

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What do you find most useful about this Technical Reference?

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