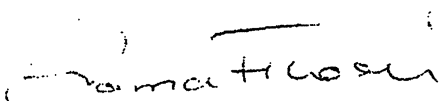


No. R. 332

24 April 2015

MINE HEALTH AND SAFETY ACT, 1996 (ACT NO 29 OF 1996)**REGULATIONS RELATING TO ELECTRICITY**

I **ADV N.A.RAMATLHODI**, Minister of Mineral Resources, under section 98 (1) of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and after consultation with the Council, hereby amend Chapter 3 of the Regulations in terms of the Mine Health and Safety Act, as set out in the in the Schedule.



ADV N.A. RAMATLHODI, MP
MINISTER OF MINERAL RESOURCES

SCHEDULE**REGULATIONS****REGULATIONS FOR ELECTRICITY UNDER CHAPTER 3****ELECTRICAL REGULATIONS****DEFINITIONS**

In these regulations, unless the context indicates otherwise:

“**Accredited Test Laboratory**” (**ATL**) means an organisation that is accredited by the South African National Accreditation System (**SANAS**).

“Arc Flash” means an uncontrolled electrical discharge through the air between **conductors** or between a **conductor** and earth. The resulting discharge of energy can result in fire, serious damage to electrical apparatus and injury or death to a person.

“Armouring” means a **metallic covering** of an electric cable, in the form of tape, wire or tube enclosing one or more **conductors** to provide adequate mechanical protection against damage.

“Bus-coupler” means a device, or set of devices, needed to facilitate the connection of two parallel **circuits**.

“Bus-section” means a device, or set of devices, that will extend a bus-bar to another.

“Circuit” means an interconnection of electrical elements such as resistors, inductors, capacitors, transmission lines, voltage sources, current sources and switches which have a closed loop giving a return path for the current.

“Clearance” means a minimum distance any part of a person’s body or any work tool may encroach to any unearthed, bare conductor or to any unearthed and unscreened conductor.

“Collectively Screened” means having a conductive covering enclosing all power **conductors** as well as all control **conductors** within the protective outer sheath of a cable.

“Conductor” means any substance or material which can transfer an electrical charge along or through it and is connected to an **electrical circuit**.

“Dead” means at or about zero potential with respect to the general mass of earth and disconnected from any live reticulation system.

“Domestic Voltage” means a voltage not exceeding 230V ± 10% alternating current phase to neutral.

“Earthed” means connected to the general mass of earth in such a manner as will ensure at all times an immediate discharge of electrical energy without risk.

“Electrical Apparatus” means any apparatus, machine and fitting in which **conductors** are used, or of which they form a part.

“Electrical Single-Line Diagram” means a diagram that shows, by means of single lines and graphic symbols, the general layout of an electric circuit or system of circuits.

“Flexible cable” means a cable of which the **conductors** consist of strands of diameter not exceeding 0,51 mm and of which the insulation and covering are such that they afford flexibility and in which the nominal cross sectional area of each **conductor** exceeds 4 mm², but shall not include signalling cable, telephone cable, blasting cable, or **flexible cord** used with electric apparatus at a voltage not exceeding **domestic voltage** alternating current on a single phase system.

“Flexible cord” means a cable of which the nominal cross sectional area of each **conductor** does not exceed 4 mm² and of which each **conductor** consists of strands of diameter not exceeding 0,31mm.

“Hazard Classification” – A system developed for categorizing electrical hazards based on the voltage and fault level ratings for electrical components.

“High Voltage (HV)” a set of nominal voltage levels in the range 44 kV and above to 220 kV.

“Individually Screened” means having a conductive covering enclosing power **conductors** individually within the protective outer sheath of a cable.

“Isolation” means disconnecting the apparatus from all possible sources of electrical potential and locking the apparatus in such a manner so that no energisation can take place.

“Insulated” means covered with any material that has the characteristic of low electrical conductivity such as to prevent an electrical discharge.

“Live” means electrically charged.

“Lockout-tagout” (LOTO) or lock and tag is a safety procedure which is used to ensure that machines / switchgear and Electrical equipment are properly isolated, de-energized and tagged.

“Low Voltage (LV)” means a set of nominal voltage levels that are used for the distribution of electricity, the upper limit of which is an a.c. voltage of 1000V or a d.c. voltage of 1 500 V.

“Medium Voltage (MV)” means a set of nominal voltage levels above the range of 1 000 V to below 44 kV.

“Metallic Covering” means iron or steel **armouring** or metal conduit surrounding two or more **conductors** with or without a lead or other metallic sheath as required in terms of operational conditions.

“Moveable Electrical Apparatus” means **electrical apparatus**, excluding **self-propelled mobile machines** or **portable electrical apparatus**, which is not installed on permanent foundations and is intended to be moved from place to place.

“Overhead Power Line” means an overhead line erected to convey electrical energy for any purpose other than communication but excluding the overhead contact or catenary wires of an electrical traction system.

“Permit to Work” is a formal, written, safe system of work to control potentially hazardous activities. The permit details the work undertaken and the necessary precautions to be taken.

“Portable Electric Apparatus” means **electric apparatus**, which is designed to be carried by hand, and may require electric power while being used.

“Reticulation System” means a **circuit** or combination of **circuits**.

“Substation” means a location containing medium or high voltage switchgear and associated equipment for the purpose of **isolation**, feeding, protecting and energising electrical equipment and reticulation systems.

“Switchgear” general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures.

“Trackless Mobile Machine” means any self propelled mobile machine that is used for the purpose of performing mining, transport or associated operations underground or on surface at a mine and is mobile by virtue of its movement on wheels, skids, tracks, mechanical shoes or any other device fitted to the machine, but excludes:

- a) rail bound equipment;

- b) scraper winches, mono rail installations, static winches, winding machinery installations and any equipment attached thereto.

“Trailing Cable” means cable used to supply power to any mobile machine and movable **electrical apparatus** which is designed to be dragged across the ground.

REGULATIONS

- 3.1 The **employer** must take **reasonable practicable** measures to ensure that:
- 3.1(1) the design of all **electrical apparatus** and electrical **reticulation systems** are approved by a competent person;
- 3.1(2) all **electrical apparatus** are under the control of a competent person; and
- 3.1(3) all **electrical apparatus** are installed, repaired and maintained by a competent person.
- 3.2 The **employer** must take **reasonable practicable** measures to ensure that no person suffers any electrical shock, **arc flash** or electrocution as a result of:
- (a) exposure to electrical current flow;
 - (b) a person coming into contact with **live** exposed parts of any **electrical apparatus**;
 - (c) exposure to electricity, **arc flash**, all fault currents, overvoltage and surges;
 - (d) any **electrical apparatus** failing due to electromagnetic interference from other equipment;
 - (e) any **electrical apparatus** being incorrectly designed, installed, operated or maintained; and
 - (f) any exposure to blasts, fires or **arc flashes** resulting from electrical faults.
- 3.3 The measures contemplated in regulation 3.2 must include measures to ensure:

- 3.3.1 proper fencing off or enclosures or **clearances** of such **electrical apparatus**.
- 3.3.2 that an extension of any electrical **reticulation system** is approved by a competent person before being energised, taking into account the reticulation network and the effect thereon;
- 3.3.3 that only competent persons are permitted to energise, de-energise or isolate **electrical apparatus** where the operation of such apparatus poses a significant risk and that such apparatus are protected against unauthorised access and operation;
- 3.3.4 that only competent persons authorised in writing by the employer to do so, carry out switching procedures on MV or HV equipment; and
- 3.3.5 that where the interruption of electrical supply to any equipment could result in a significant risk, such electrical supply can be provided from another source or network, which can include an emergency supply alternator or generator, for power supply in the event of an interruption to the normal power supply.
- 3. 4 The **employer** must take **reasonably practicable** measures to ensure that at any place at a mine, where **electrical apparatus** is installed and which may constitute a danger to persons shall be:
 - (a) of adequate size so as to provide safe and unobstructed clear working space for operating and maintenance staff;
 - (b) constructed and ventilated in such a manner that the apparatus is kept at a safe temperature to safeguard persons;
 - (c) constructed in such a manner as to provide protection where necessary against the ingress of vermin and water;
 - (d) illuminated in such a manner as to prevent any danger to persons and to enable all equipment to be distinguished clearly and all instruments, labels and notices to be read clearly while it is **live**;
 - (e) equipped with effective means to safely disconnect the energy source; and
 - (f) equipped with an effective fire extinguishing system.

- 3.5 The employer must take **reasonably practicable** measures to ensure that at every **substation** there must be a legible, up to date single line drawing of the **reticulation system**, highlighting ring feeds, of which that **substation** is a part, displayed in a conspicuous place. Every **substation** must be clearly identified, and its position clearly marked on such drawing.
- 3.6 The **employer** must take **reasonably practicable** measures to ensure that the area in which a **substation** is located is clearly demarcated and that notices are displayed at every point of entry to such an area. These notices shall:
- (a) prohibit access of any unauthorised person from accessing that area;
 - (b) set out the procedures to be followed in the event of a fire;
 - (c) set out the first aid treatment measures to be given to persons suffering from the effects of electric shock and burns;
 - (d) indicate the presence of electricity;
 - (e) describe measures to safely remove any person incapacitated as a result of contact with electricity; and
 - (f) have available an effective means of communication.
- 3.7 The **employer** must take **reasonably practicable** measures to ensure that all suspended electrical cables that could cause a fire due to faults or mechanical damage, in stopes, haulages or shafts either through damage by moving machinery or by fall of ground are properly protected by:
- (a) **switchgear** which is electrically supplied and commissioned with discrimination settings for overload and earth fault protection to prevent a fire;
 - (b) **switchgear** installed which is correctly rated to prevent a fire or explosion;
 - (c) all cables in areas where a fire can occur must be fire retardant cables or be coated with fire retardant material at areas in close proximity with timber; and

- (d) the employer must have a procedure to be followed in the event of such a fire.
- 3.8 The **employer** of every coal mine must take **reasonably practicable** measures to ensure that all new main reticulation underground **substations** are designed and located such that they vent into the return air-way.
- 3.9 The **employer** must take **reasonably practicable** measures to ensure that where mineral oil is used as the medium for insulation or cooling of **electrical apparatus**, adequate precautions are in place to address any significant risk in the event of an explosion, spillage or burning of the oil.
- 3.10 The **employer** must take **reasonably practicable** measures to ensure that where **electrical apparatus** is accessible from the front and the back, each such apparatus are identifiable by clearly labelled and legible markings on the front and back fixed portions of such apparatus and on **switchgear** shutters.
- 3.11 The **employer** must take **reasonably practicable** measures to ensure that where ring feeds including **bus-sections** and **bus-couplers** are accessible from the front and the back, each such apparatus are identifiable by clearly labelled and legible markings on the front and back fixed portions of such apparatuses and on **switchgear** shutters.
- 3.12 The **employer** must take **reasonably practicable** measures to ensure that all **electrical apparatus** used for the distribution of electrical power, except **electrical apparatus** which contains **domestic voltages**, are clearly marked with the maximum voltage that may be present therein.
- 3.13 The **employer** must take **reasonably practicable** measures to ensure that no examination, adjustment, testing, repair or other work necessitating the dangerous approach to or the handling of **electrical apparatus** shall be carried out unless such apparatus is **dead**: Provided that where such equipment must be **live** for the purpose of examination, adjustment, repair or other work it may be done by or under the direct supervision of a competent person.
- 3.14 The **employer** must take **reasonably practicable** measures to ensure that no person other than a competent person authorised in writing by the employer to do so, enters a place where **electric apparatus** is installed unless all **live conductors** therein are **insulated** adequately or otherwise protected effectively against

inadvertent contact: Provided that such authorised competent person may in case of an emergency be assisted by a person acting under the immediate personal supervision of such authorised competent person.

3.15 The **employer** must take **reasonably practicable** measures to ensure that when work is to be carried out on **electrical apparatus** which have been isolated from all sources of electrical supply, effective precautions shall be taken:

i) by discharging all stored electrical energy, and

ii) testing for **dead** including any ring feeds by earthing such apparatus and, in the case of ring-feeds or dual supplies of power, by earthing on both sides of the associated **electrical apparatus** worked on, so as to prevent any **conductor** or apparatus from being made **live** while any person is working thereon.

3.16 The **employer** must take **reasonably practicable** measures to ensure that any accessible metallic portion of **electric apparatus** which, though not normally forming part of an **electric circuit**, may inadvertently become **live**, is **insulated** or **earthed** by a **conductor** of adequate cross-sectional area capable of withstanding the maximum possible earth fault current condition, so as to prevent any significant risk to persons for the duration that the fault current may be flowing in the **circuit**.

3.17 The **employer** must take **reasonably practicable** measures to ensure that whenever work is to be carried out on **electrical apparatus** which has been isolated from all sources of supply, effective precautions shall be taken by earthing or other means to discharge electrically such **electrical apparatus** or any adjacent **electrical apparatus** to prevent any **conductor** or apparatus from being made **live** accidentally or inadvertently while any person is working thereon.

3.18 The **employer** must take **reasonably practicable** measures to ensure that no metal ladder or ladder with metal reinforced stiles is used for examination, repair, or other work necessitating the dangerous approach to or work on **electrical apparatus**.

3.19 The **employer** must take **reasonably practicable** measures to ensure that any accessible metallic portion of electrical plant or apparatus which, though not forming part of an electrical **circuit**, may accidentally become **live** shall either be protected by an

insulating material or shall be connected to earth by a **conductor** of adequate cross-section so as to prevent danger to persons.

- 3.20 The **employer** must take **reasonably practicable** measures to ensure that the cross-sectional area of any earthing **conductor** is calculated to be capable of withstanding the maximum possible earth fault current condition.
- 3.21 The **employer** must take **reasonably practicable** measures to draw up and implement a procedure for all energising, de-energising and **isolation** of medium or high voltage **electrical apparatus**.
- 3.22 The **employer** must take **reasonably practicable** measures to ensure that where any electrical cable is buried in the ground or installed in such a position that mechanical damage to it may occur, it is protected by **armouring**.
- 3.23 The **employer** must take **reasonably practicable** measures to ensure that all **flexible cables** or **trailing cables** may only be used in connection with the operation of-
- (a) any self-propelled mobile machine which requires electric power to operate such machine;
 - (b) movable **electric apparatus**; or
 - (c) **portable electric apparatus**.
- 3.24 The **employer** must take **reasonably practicable** measures to ensure that any **flexible cable** or **trailing cable** used in or on a mine or works shall be screened either individually or collectively and such screens shall be **earthed**: Provided that a cable used in a hazardous area shall be screened individually.
- 3.25 The **employer** must take **reasonably practicable** measures to ensure that no **flexible cable** or **trailing cable** shall have more than fifteen joint repairs, including sheath patches over a length of 200 metres and no joint repair or patch shall be closer than 5 metres to an adjacent joint, repair or patch and no joint, repair or patch shall be closer than 3 metres to the cable plug or its terminal connection at the machine or apparatus.
- 3.26 The **employer** must take **reasonably practicable** measures to ensure that any cable reel used in connection with self-propelled mobile machine shall be provided with a device which shall interrupt the power supply to the cable before the complete cable is

unreeled so that at least one complete turn of the cable shall remain on the reel when the interruption of the power supply has been effected, unless the machine's maximum range of travel is limited to less than that permitted by the cable on the reel for reasons other than the length of the cable.

- 3.27 The **employer** must take **reasonably practicable** measures to ensure that no electrical cable trench or duct is left open, uncovered or unprotected, except when persons are working in such trench or duct or where precautions have been taken to prevent persons from inadvertently falling into such trench or duct.
- 3.28 The **employer** must take **reasonably practicable** measures to ensure that persons are prevented from significant risks arising from inadvertent contact with **overhead power lines** by **trackless mobile machines/ rail bound equipment** or while erecting or moving structures or other objects.
- 3.29 The **employer** must take **reasonably practicable** measures to ensure that persons carrying out examinations, repairs or other work at elevated positions in close proximity to exposed **electrical apparatus** are protected from **live** electrical contact.
- 3.30 The **employer** must take **reasonably practicable** measures to ensure that surface residential and commercial buildings are to be wired and protected in accordance with South African Bureau of Standards Code of Practice SANS 10142-1, 2006, "Wiring of premises and installations not exceeding 1kV". The normative references in SANS 10142-1, 2006 are not applicable to the **employer**.
- 3.31 The **employer** must take **reasonably practicable** measures to ensure that the design and construction of **overhead power lines** are in accordance with South African Bureau of Standards Code of Practice SANS 10280, 1995, "**Overhead power lines** for conditions prevailing in South Africa". The normative references in SANS 10280, 1995 are not applicable to the **employer**.
- 3.32 The **employer** must take **reasonably practicable** measures to ensure that electrical security fencing is erected and maintained in accordance with the South African Bureau of Standards Code of Practice SANS 10222 : 2002, Part 3, "Electrical Security Fences (non lethal)". The normative references of SANS 10222, 2002 are not applicable to the **employer**.

- 3.33 The **employer** must take **reasonably practicable** measures to ensure that any helmet light assemblies used underground at a mine complies with SANS 1438, 2013 "Helmet light assemblies for miners". The normative references of SANS 1438, 2013 are not applicable to the **employer**.
- 3.34 The **employer** must take **reasonably practicable** measures to ensure that any helmet light assemblies used underground are tested in accordance with the requirements of ARP 0108:2013.
- 3.35 The **employer** must take **reasonably practicable** measures to ensure that the operating voltage of any portable lamp used at a mine does not exceed 32 volts.
- 3.36 The **employer** must take **reasonably practicable** measures to ensure that all **electric apparatus** are selected, installed, worked and maintained in such a manner as not to constitute a hazard and shall be placed and protected in such a manner that no person can be injured by inadvertent contact with any **live** portion.
- 3.37 The **employer** must take **reasonably practicable** measures to ensure that all **electric apparatus** used in a hazardous area shall be explosion protected and certified as such by an inspection authority (Ia) certificate issued by an **accredited test laboratory**.
- 3.38 The **employer** must take **reasonably practicable** measures to ensure that any type and design of explosion protected apparatus shall at all times be identified in an inspection authority (Ia) certificate and an identification number shall be allocated to such apparatus by the **accredited test laboratory**.
- 3.39 The **employer** must take **reasonably practicable** measures to ensure that **explosion protected** apparatus is not used at a mine unless the manager is in possession of a copy of the inspection authority certificate. The identification number referred to in regulation 3.36 must be clearly and indelibly marked on the apparatus or on a metal plate (other than a light metal) permanently fixed to the apparatus.
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