

*WORLD CLASS MINERALS AND ENERGY SECTORS THROUGH SUSTAINABLE DEVELOPMENT*

## DEPARTMENT OF MINERALS AND ENERGY



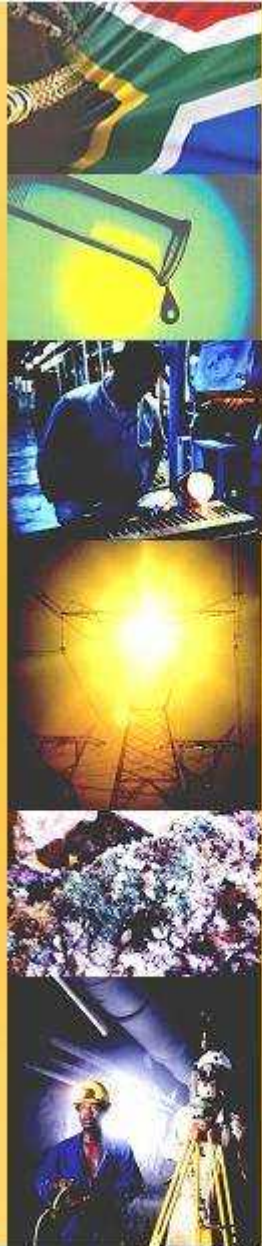
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Minerals and Energy  
**REPUBLIC OF SOUTH AFRICA**

# Electrical Regulations

## Definitions

- **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
- **Circuit** means an electric circuit forming a **system** or branch of a **system**.
- **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 which can transfer an electrical charge along or through it and arranged to be electrically connected to a **system**
- **Dead** means at or about zero voltage with respect to the general mass of earth and disconnected from any live **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 danger.



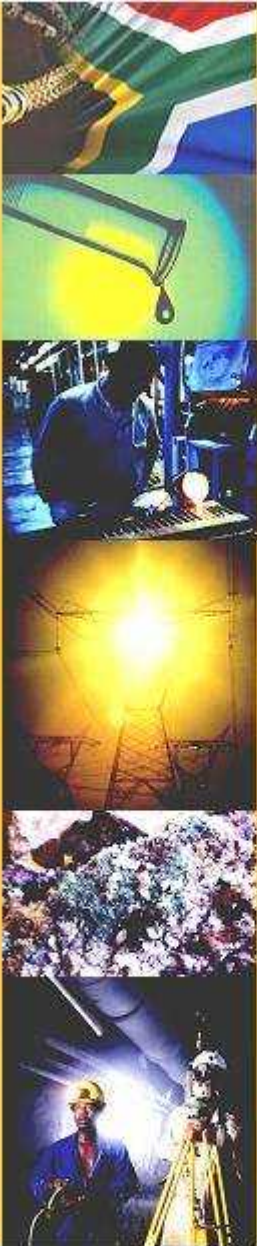


•**Electrical apparatus** means any apparatus, machine and fitting in which **conductors** are used, or of which they form a part.

•**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 4mm<sup>2</sup>, but shall not include signalling cable, telephone cable, blasting cable, or **flexible cord** used with electric apparatus at a voltage not exceeding 230 volts+/- 10% 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 mm<sup>2</sup> and of which each **conductor** consists of strands of diameter not exceeding 0,31 mm

•**High Voltage** a set of nominal voltage levels in the range 44 kV to 220 kV.



- **Individually screened** means having a conductive covering enclosing power **conductors** individually within the protective outer sheath of a cable.
- **Insulated** means covered with insulating material of such quality and thickness that it will not allow an electrical discharge.
- **Live** means electrically charged
- **Low Voltage** means a set of nominal voltage levels that are used for the distribution of electricity, the upper limit of which is generally accepted to be an a.c. voltage of 1 000 V (or a d.c. voltage of 1 500 V).
- **Medium Voltage** means a set of nominal voltage levels in the range 1 kV to 44 kV that lie above low voltage and below high voltage.
- **Metallic covering** means iron or steel **armouring**, with or without a lead or other metallic sheath as the conditions of the case may require, or an iron or steel pipe surrounding two or more **conductors**.



• **Moveable electric apparatus** means electrical apparatus, excluding *self propelled mobile machines* or *portable electric apparatus*, and which is not installed on permanent foundations and is intended to be moved from place to place when it is in use.

• **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 electric traction system.

• **Portable electric apparatus** means electric apparatus, which is designed to be carried by hand, and which may require electric power while it is being carried during use.

• **Substation** means an enclosure in which medium voltage or higher voltage switchgear is kept that may be used to energise or isolate power supplies to equipment or installations.

• **System** means an electrical system in which all the *conductors* and apparatus are electrically connected to a common source of electromotive force.



**Self propelled mobile machinery** means any machine which is self propelled, requires a driver and is used for the purpose of performing mining operations or for performing similar operations at a works.

**Trailing cable** means a ***flexible cable*** used to supply power to any mobile machine and which is designed to be dragged across the ground Click to add text

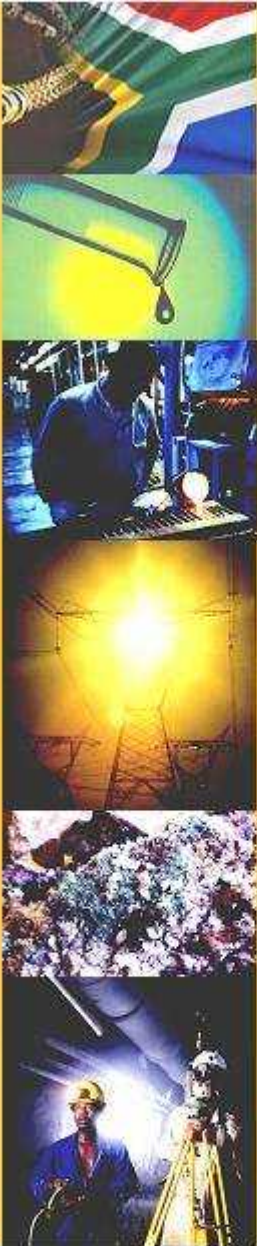


## Regulations

3.1 The employer must take reasonable measures to ensure that all electrical apparatus and electrical reticulation systems are designed, constructed, installed, operated and maintained by a competent person or under the direct supervision of such a competent person

3.2 The employer must take reasonable measures to ensure that no person suffers any electrical shock, thermal burning or electrocution as a result of:

- (i) exposure to current flow;
- (ii) a person unintentionally coming into contact with exposed parts of any electrical apparatus;
- (iii) exposure to thermal effect, overcurrent, short circuit, fault current, earth fault, overvoltage and undervoltage;
- (iv) any electrical apparatus failing due to electromagnetic interference from other equipment.
- (v) any electrical apparatus being incorrectly selected, installed, operated or maintained;
- (vi) any electrical apparatus being placed and protected in such a manner as to allow inadvertent contact with any live portion thereof; and
- (vii) any exposure to fires as a result of electrical faults



3.3 The measures contemplated in regulation 3.2 must include measures to ensure that-

**3.3.1** where the interruption of electrical supply to any equipment could result in a significant risk, such electrical supply can be substituted from another source or network, which can include an emergency supply alternator / generator, for power supply in the event of an interruption to the normal power supply;

**3.3.2** an extension of any electrical reticulation system is approved by a competent person (**engineer**) taking into account the reticulation network and the effect thereon;

**3.3.3** only competent persons operate switchgear of machinery where the operation of such machinery poses a significant risk and that such switchgear is protected against unauthorised access and operation;

;



### 3.3.4

***electrical apparatus and switchgear*** in substations are installed:

- (a) with sufficient clearances to prevent inadvertent contact with live ***conductors***;
- (b) in such a manner to prevent environmental conditions leading to such electrical apparatus and switchgear posing a significant risk to persons;
- (c) so as to provide unrestricted clearances around the apparatus or switchgear to enable escape of personnel during normal operation and emergencies;
- (d) with an effective means to disconnect the energy source; and
- (e) together with means to effectively extinguish any fire in the substation;





### 3.3.5

at every substation there is to be displayed an up to date reticulation drawing of the reticulation system of which that substation is a part. Every electrical sub-station must be clearly identified, and its position clearly marked on the reticulation drawing;

### 3.3.6

the area in which a **substation** is located is clearly demarcated and that notices are displayed at any point of entry to such an area:-

prohibiting any unauthorised person from handling or interfering with **electrical apparatus and switchgear**,

setting out the procedure in the case of fire;

(c) setting out the first aid treatment to be given to persons suffering from the effects of electric shock and burns; and

(d) containing the standard symbolic signs for the presence of electricity



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### 3.3.7

where oil is used as the medium for insulation or cooling of electrical equipment, adequate precautions are in place to address any significant risk in the event of an explosion, spillage or burning of the oil;

### 3.3.8

all **electrical apparatus** and switchgear are provided with effective switching, controlling and protective devices which in the event of a fault is capable of automatically isolating the power supply to such apparatus;

### 3.3.9

where **electrical apparatus** and switchgear are accessible from the front and the back, each such electrical apparatus and switchgear is identifiable by markings on a fixed portion on the front and back of such apparatus;





### 3.3.10

where a ring feed or the possibility of electrical back feed exists at **electrical apparatus**, a prominent notice to that effect is fixed to such apparatus and is visible from the front and back of such apparatus;

### 3.3.11

all **electrical apparatus** are clearly marked with the maximum voltage that may be present therein unless such apparatus contains voltages lower than 50 volts;

### 3.3.12

where **electrical apparatus or switchgear** is required to be **live** for the purpose of examination or testing, such examination or testing is done by a competent person<sup>2</sup> in the company of a person conversant with the risks of electricity, and both these persons are suitably protected from live contact and flash;

### 3.3.13

whenever work is to be carried out on **electrical apparatus** which has been isolated from all sources of supply, effective precautions are taken, by earthing or other means, to electrically discharge such apparatus so as to prevent any **conductor** or apparatus from being made **live** while any person is working thereon;





### 3.3.14

any accessible metallic portion of electric plant or apparatus which, though not normally forming part of an electric circuit, may inadvertently become *live*, is *insulated* or connected to earth 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 that may be flowing in the circuit;

### 3.3.15

all switching operations of medium voltage or higher voltage switchgear are carried out in accordance with a procedure prepared and implemented by the employer;

### 3.3.16

where any electrical cable is buried in the ground or installed in such a position that mechanical damage may occur, it is protected by an *armouring*;



### 3.3.17

where **flexible cable** or **trailing cable** is used underground in connection with the operation of the following, is individually screened and that such screen is earthed:

self-propelled mobile machines which require electric power to operate such machines;

**moveable electric apparatus;** and

(c) **portable electric apparatus;**

### 3.3.18

the number or position of joint repairs and sheath patches on any **flexible** or **trailing cable** does not result in such **flexible** or **trailing cable** creating a significant risk when operated;

### 3.3.19

any cable reel used in connection with a self propelled mobile machine is fitted with a device that will interrupt the power supply to the cable before tension is applied to the cable connection;



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### 3.3.20

a competent person<sup>2</sup>:

- (a) examines and tests all new and re-erected electric apparatus and switchgear before it is put into service; and
- (b) at least once in every six months thoroughly examines and tests all electrical apparatus for earth continuity and functioning of associated protective devices, except in cases where a continuous earth monitoring system has been installed;

### 3.3.21

all medium voltage and high voltage switchgear protection devices are tested for correct functioning-

- (a) on commissioning or after any primary circuit component change which may affect the function of the protection device, by means of primary current injection; and
- (b) annually;



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### 3.3.22

the person or persons carrying out the examinations or tests referred to in regulations 3.3.20 and 3.3.21 record the results thereof, and that such results are promptly brought to the attention of the competent person<sup>1</sup>, who must ensure that the settings comply with the network design criteria to verify the correct setup;

### 3.3.23

all welding machines are provided with appropriated means of protecting persons using such machine against electrocution; and examined and tested every time prior to use to ensure that all safety devices on them function properly;

### 3.3.24

inadvertent contact with overhead power lines by ***self propelled mobile machines*** or while erecting or moving structures, is prevented;



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### 3.3. 25

persons carrying out examinations, repairs or other work at elevated positions in close proximity to **electrical apparatus** are protected from live electrical contact;

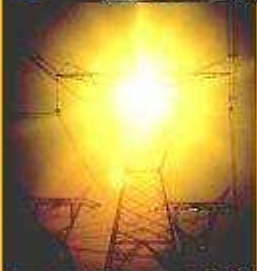
### 3.3.26

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;

### 3.3.27

electrical equipment using **domestic voltages** is wired and protected in accordance with South African Bureau of Standards Code of Practice SANS 10142-1, 2004, "Wiring of premises and installations not exceeding 1kV" and equipment must comply with the relevant SANS equipment standard;

NOTE. Normative references in SANS 10142-1, 2004 are not applicable to the employer



### 3.3. 25

persons carrying out examinations, repairs or other work at elevated positions in close proximity to **electrical apparatus** are protected from live electrical contact;

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electrical equipment using **domestic voltages** is wired and protected in accordance with South African Bureau of Standards Code of Practice SANS 10142-1, 2004, "Wiring of premises and installations not exceeding 1kV" and equipment must comply with the relevant SANS equipment standard;

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### 3.3.28

the design and construction of 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" ;

NOTE Normative references in SANS 10280, 1995 are not applicable to the employer



### 3.3.29

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)”;

NOTE The normative references of SANS 10222, 2002 are not applicable to the employer.





### 3.3.30

any portable electric lamp or helmet light assemblies used in a *mine* shall be certified portable electric lamps and helmet light assemblies which must be maintained and repaired by a *competent person*<sup>3</sup> complies with, and is maintained in accordance with SANS 1438, 2006 “Helmet light assemblies for miners”;

### 3.3.31

every helmet light assembly must be tested by an accredited Test Laboratory and certified by an approved Certified body in accordance with the requirements as prescribed in the South African National Standards Standard Specification SANS 1438, “Helmet light assemblies for miners,” and must be maintained and repaired by a *competent person*<sup>3</sup> in accordance with the requirements as prescribed in the South African National Standards Code of Practice SANS 10282, 2006 “The Maintenance of Helmet Light Assemblies”;  
NOTE: No normative references are listed in SANS 10282 and SANS 1438 are not applicable to the employer.

**3.3.32** the operating voltage of any portable lamp used during cleaning, repairing, or inspection of any equipment does not exceed 32 volts