

OCCUPATIONAL HEALTH AND SAFETY SPECIFICATION

FOR
PROJECTS AND MAINTENANCE
(BUILDING/ELECTRICAL/MECHANICAL)

PROJECT:

ENG005/2016

**Supply, Delivery and Installation of
66 kv switchgear for a period of three years.**

Date of survey: 29 JANUARY 2016

COMPILED BY:

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OCCUPATIONAL HEALTH AND SAFETY SPECIFICATION

(BUILDING/ELECTRICAL/MECHANICAL)

Project: ENG005/2016 Supply, Delivery and Installation of 66 kv switchgear for a period of three years.

HAZARD IDENTIFICATION AND RISK ASSESSMENT

TERMS OF REFERENCE

Mr. Roscoe Nel of Integrated Safety and Health Systems (Pty) Ltd conducted a Health and Safety Risk Assessment based on **scope of works set out, site visit and technical specifications of the works intended and approved architectural drawings**. The survey was conducted **on 29 January 2016**, during normal working hours.

EXECUTIVE SUMMARY

All construction and maintenance activities can subject workers to levels of environmental stressors and safety factors, e.g. noise, fumes, revolving machinery, tools, moving vehicles, electrocution, etc., which permanently harm the health and physical wellbeing of persons at work and greatly reduce productivity. The Occupational Health and Safety Act of 1993, and its relevant regulations, require employers to conduct surveys of the actual situation at every site. Measurements must be taken and the identified problems addressed by the employer. Improved conditions ensure better worker morale, loyalty and greater productivity.

SCOPE OF WORK

This project, the **SUPPLY, DELIVERY AND INSTALLATION OF 66 KV SWITCHGEAR FOR A PERIOD OF THREE YEARS** as set out in technical specifications which cover the general requirements for the design, manufacture and testing of circuit breakers and must fulfill the relevant requirements specified in IEC 62271-100.

The supplier shall submit evidence that the design, manufacture and testing of the circuit breakers and disconnecting circuit breakers comply with ISO 9001 and ISO 14001, including components sourced from sub-suppliers

Other Standards applicable as referred to in the technical specification

- IEC 62271-300 High-voltage alternating current circuit-breakers - Guide for seismic qualification of high-voltage alternating current circuit-breakers. (old number: IEC 61166)
- IEC 62271-100 High-voltage alternating-current circuit-breaker

Fig 1



LOCATION OF SITE AND ELEMENTS SPECIFIC TO THE LOCATION (MUNICIPAL BY-LAWS, WEATHER FACTORS, GEOGRAPHICAL FACTORS)

- The site is located within GEORGE MUNICIPALITY, CJ Langenhoven Road, Langenhoven Switching station.
- Special attention and consideration to internal Municipal Regulations Module 1 – 5 (ref: EII/21/NT) should be strictly adhered to and emergency actions/plan of the facility/municipality should be adopted.
- Access to live chambers and prohibited areas (Fig 2 &3) is stringently controlled with specific authorisations to different categories of employees issued by the Director after competency regarding different categories has been achieved. Colour coded padlocks is used.

Fig 2



Fig 3



For convenience, the general findings are given as follows:

Hazard Identification and Risk Assessment (HIRA):-

From the HIRA investigation it was found that:

Chemical & Biological hazards

Handling of potential hazardous chemical substances that include:

- SULPHUR HEXAFLUORIDE GAS (SF₆)
 - Is used at very low pressures to insulate certain areas of sub-stations and for arc extinction within switchgear. Sulphur hexafluoride gas in its pure form is inert, colourless, non-flammable, non-toxic, and five times heavier than air and a greenhouse gas. In sub-stations it is sealed within compartments that must have a warning sign denoting SF₆ presence on the exterior. It can only escape in fault conditions, which includes fires, when it can generate toxic and corrosive gases or powder that can cause skin burns and severe damage to eyes.
- FUELS/CHEMICALS/OILS
 - As well as bulk fuels to generate the electricity, smaller quantities of other fuels and chemicals including acids, gases, liquid petroleum gases, petroleum and diesel may be present at electrical installations;

Physical hazard

- Site establishing: tools and equipment falling when offloading;
- Transport of Labourers and work tools and equipment to and from site.
- Labourers falling from vehicles, Collisions with other vehicles. Collisions with items being transported on same vehicle; Collisions with pedestrians.
- Work from Elevated positions and unstable elevated structures, persons can fall from elevated positions when working from ladders, scaffold. Items can fall on persons from elevated positions.
- Impalement, entrapment, collapse, fire and noise.
- Collapse of temporary works/ structures/equipment.
- Inadequate Equipment Identification and improper use of equipment leading to direct contact with live electricity.
- Electrocution through, Arcing high voltage equipment, Re-energising circuits and equipment(programmed automatic switches),contact with equipment that carry residual charge, Flash downs, Contact with high voltage overhead lines, Ground becoming live through contact with high voltage equipment,etc
- Vandalism and sabotage of systems due to failure of site security measures (fence)

Ergonomics

- Workplace conditions that pose the risk of injury to the musculoskeletal system of the worker including weather conditions.
- Manual material handling can pose a possible risk when lifting/carrying/assembling maintenance material

CONCLUSION

All relevant standard operating procedures set out in municipal regulation E11/21/NT must be adhered to at all times and control measures of hazards: Elimination possible hazards with design, Engineering, Administrative and PPE measures must be implemented as best as practicably possible

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1. INTRODUCTION AND BACKGROUND

1.1 Background to the Pre-construction Health and Safety Specification

The Construction Regulations February 2014 place the onus on the client to prepare a pre-construction Health & Safety Specification, highlighting all risks not successfully eliminated during design.

1.2 Purpose of the Pre-construction Health and Safety Specification

The purpose of the pre-construction H&S specification is to assist with the achievement of compliance with the OHS Act, and in particular with the Construction Regulations, so as to reduce incidents and injuries on the project. The pre-construction specification enables Tenderers to make adequate financial provisions in their tenders to cover the H&S requirements of the project and thereafter, for the Contractor and its sub-contractors to use as the basis for the preparation of the construction phase H&S plan.

The pre-construction specification sets out the basic requirements to be met by the Contractor and all sub-contractors so that the H&S of all persons potentially at risk may receive a priority at least equal to the other facets of the project such as the standard of workmanship, costs, programme, environment, etc.

1.3 Implementation of the Pre-construction Health and Safety Specification

This specification forms an integral part of the contract, and the Contractor is required to use it at pre-tender phase when drawing up its project-specific construction phase health & safety plan, to be **approved by the Client** or his appointed representative before commencement of construction work. The Principal contractor shall forward a copy of this specification to all Contractors at their bidding stage so that they can in turn prepare health & safety plans relating to their operations.

Note: It is still and will be the responsibility of every Professional consultant, contractor, sub contractor and services provider to make themselves conversant with the various Acts pertaining to their profession at all times.

This document does not purport to be an exhaustive canvassing of all issues and duties imposed by the Occupational Health and Safety Act, Act 85 of 1993 of Regulations governing the duties and obligations of a contractor performing duties i.t.o. an agreement with the client (Sect 37(2)).

The various duties imposed on a contractor are more fully described in the OHS Act, Act 85 of 1993 and its regulations and the contractor should acquaint her/himself therewith before commencing with any work.

The Principal Contractor and Contractors shall provide and demonstrate to the Client competencies to carry out the work and a suitable and sufficiently documented Health & Safety Plan based on the Health & Safety specifications (a Proforma copy of the health and safety plan summarizing the items below (H&S Plan) and indicating the appointed risks assessors experience and qualifications, to be handed in with the tender documentation). The Client and or his appointed representative will discuss and negotiate the H&S Plan with the PC before giving final approval for implementation. The H&S Plan and file should include but is not limited to the following:

1.3.1 Guide for the preparations of a typical H&S PLAN

H&S Plan

- **Project specific hazards identified,**
- **Safe work procedures and control measures,**
- **Letter of good standing from COID or FEM.**

H&S FILE

- **Description of project,**
- **Client appointment letter,**
- **Reporting of construction work to dept of labour,**
- **Letter of good standing with COID or FEM**
- **A general statement of health and safety principals and objectives,**
- **Management structure and objectives (organogram),**
- **H&S Plan,**
- **Selection procedures and control of all sub-contractors with methods of communication and co-operation,**
- **Appointment of Construction Manager, subordinates and construction supervisor/s,**
- **Site specific risk assessments and review procedures and;**
- **Competency of risk assessor and appointment letter,**
- **Information & training arrangements,**
- **a list of all equipment and materials,**
- **Storage and distribution of materials on site,**
- **Control and disposal of waste,**
- **Provision of all facilities for staff and visitors,**
- **Provision and use of utilities, eg. Electricity and water,**
- **List of tasks to be performed, equipment and PPE to be used during construction process.**
- **H&S Specifications to be supplied to sub-contractors (a\if any is to be used),**
- **Site traffic control and rules (signage, flag person training, PPE etc) access control to and from construction site, (pedestrian and vehicle traffic control)**
- **First aid and Emergency (disaster recovery and contingency) plan,**
- **Environmental Control Programme.**
- **List of relevant prescribed appointments,**
- **List of inspection registers to be used.**
- **List of toolbox talks.**

1.3.2 AUDITS BY THE EMPLOYER

- **The Contractor shall permit the Employer to regularly audit, at an agreed interval, the implementation and maintenance of the approved health and safety plan and shall co-operate and provide all the required documentation, as may be required, in this regard.**

1.3.3 VARIATIONS

- **Should any variations be ordered or design amendments issued the Engineer shall inform the Contractor of all the associated potential hazards to ensure that the health and safety aspects of the work ordered are taken into account.**

2. PRE-CONSTRUCTION HEALTH AND SAFETY SPECIFICATION

2.1 Scope

This health and safety (H&S) specification is the Client's H&S specification prepared in accordance with Clause 5(1)(b) of the Construction Regulations. It covers the requirements for eliminating and mitigating incidents and injuries during the construction phase of the project. The specification addresses legal compliance, hazard identification and risk assessment, risk control, and promoting a health and safety culture amongst those working on the project. The specification also makes provision for the protection of those persons other than employees of the Principal Contractor and Contractors

2.2 Interpretations

2.2.1 Application

This specification is a compliance document drawn up in terms of South African legislation and is therefore binding. It must be read in conjunction with the relevant legislation as noted **at point 2.8**.

The Client reserves the right to add or make changes to any Health and Safety Plan of a contractor as it sees fit.

This specification is not intended to over-ride, or in any way to amend, the statutory/regulatory documents and, in the event of there being any conflict, the legislation will take precedence.

2.2.2 Definitions

The definitions as listed in the Occupational Health & Safety Act 85/1993 and Construction Regulations (February 2014) shall apply to this H&S specification. More specifically, where used in this H&S specification, "Principal Contractor" means the Contractor, "Contractor" means sub-contractors to the Principal Contractor, and "Client" means the Employer or his/her duly appointed Agent

2.2.3 Specific items pertaining to this contract.

Tenderers attention is drawn to the information provided within the specification and the priced document regarding, but not limited to, the design and type of construction; the material specified; and the construction period in so far as they to be provided for in the contractors Health and Safety Plan.

2.3 Minimum Administrative Requirements

2.3.1 Notification of Intention to Commence Construction Work

On receipt of the Client's notification of award of the contract and, in any event before any construction work commences, the Principal Contractor shall notify the Provincial Director of the Department of Labour (**George**) in writing of the intention to undertake construction work. Annexure A to the Construction Regulations must be used for that purpose. A copy of the completed notification must be forwarded to the Client and to the Engineer and a copy shall be attached to the H&S plan. The addresses of the nine Provincial Directors of the Department of Labour are given in Clause 1 of the General Administrative Regulations to the OHS Act

2.3.2 Assignment of the CEOs' Responsibility For Health and Safety on Site

In terms of Section 16 of the Act, the CEO's of the Client, the Engineer, the Principal Contractor and all other Contractors shall make the requisite assignments of their responsibilities in writing prior to commencement of work on site. It is noted that, in a large organisation, the CEO may decide to assign his responsibilities to a line manager who may in turn assign his responsibilities to another line manager and so on.

2.3.3 Assignment of Contractor's Responsible Persons to Supervise Health and Safety on Site

The Principal Contractor's CEO (or his duly assigned employee) shall appoint (in writing) one full time competent person as the construction manager with the duty of managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance, and in the absence of the construction manager an alternate must be appointed by the principal contractor. The construction manager to be registered with South African Council for the Project and Construction Management Professions (SACPCMP) A construction manager must (in writing) appoint construction supervisors responsible for construction activities and ensuring occupation health and safety compliance on the construction site. The Principal Contractor's and the Contractors' competent persons for the various roles shall fulfil the criteria as defined the Construction Regulations. Copies of these appointments, together with proof of competence of the individuals concerned, shall be attached to the H&S plan. Proof of competencies shall take cognisance of the definition of a "competent person" as set out in the Construction Regulations and may comprise CV's and written motivations/ recommendations by the persons' direct report.

2.3.4 Competency for Contractor's Appointed Competent Persons

Contractor's competent persons for the various risk management portfolios shall fulfill the criteria as stipulated under the definition of Competent in accordance with the Construction Regulations (February 2014). Proof of competence for the various appointments must be included in the health and safety plan.

Definition of "competent person" (expressed by Construction Regulations, 2014:)
means a person who-

- (a) has in respect of the work or task to be performed the required knowledge, training and experience and, where applicable, qualifications, specific to that work or task: Provided that where appropriate qualifications and training are registered in terms of the provisions of **the National Qualification Framework Act, 2000 (Act No.67 of 2000)**, those qualifications and that training must be regarded as the required qualifications and training;

No contractor may appoint a construction health and safety officer to assist in the control of health and safety related aspects on the site unless he or she is reasonably satisfied that the construction health and safety officer that he or she intends to appoint is registered with a statutory body approved by the Chief Inspector (**SACPCMP**) and has necessary competencies and resources to assist the contractor

2.3.5 Compensation of Occupational Injuries and Diseases Act 130 of 1993 (COIDA/FEM)

The Principal Contractor shall submit a letter of good standing with its Compensation Insurer, to the client or his appointed representative, as proof of registration. Contractors shall submit proof of registration to the Principal Contractor before they commence work on site. (see 1.3.1)

2.3.6 Occupational Health and Safety Policy

The Principal Contractor and all other Contractors shall submit to the Client and to the Engineer, a copy of their organisation's H&S Policy signed by their Chief Executive Officer. Each policy must include a description of the organisation and state the H&S objectives and how they will be achieved and implemented by the organisation. Copies of these policies shall be attached to the H&S plan

2.3.7 Health and Safety Organogram

The Principal Contractor and all Contractors shall submit an organogram, outlining the Health and Safety Site management Structure including the relevant appointments/competent persons and shareholders. In cases where appointments have not been made, the organogram shall reflect the intended positions. The organogram shall be updated when there are any changes in the Site Management Structure. A copy shall be attached to the H&S plan.

2.3.8 Preliminary Hazard Identifications and Risk Assessment and Progress Hazard Identification and Risk assessment.

The contractor shall cause a hazard identification to be performed by **a competent person** before commencement of construction work, and the assessed risks shall form part of the construction phase health and safety plan submitted for approval by the Client.

The risk assessment must include;

- a) A list of hazards identified as well as potentially hazardous tasks;
- b) A documented site specific risk assessment based on the list of tasks and associated hazards;
- c) Method statements and a set of safe working procedures to eliminate, reduce and/or control the risks assessed;
- d) A monitoring and review procedure of the risks assessment as the risks change

The Principal Contractor shall ensure that all employees and or Contractors are competent to perform the work and informed, instructed and trained by a competent person regarding any hazards, risks and related safe work procedures before any work commences and thereafter at regular intervals as the risks change and as new risks develop. Proof of this shall be kept on the H&S file.

The Principal Contractor shall be responsible for ensuring that all persons who could be negatively affected by its operations are informed and trained according to the hazards and risks and are conversant with the safe work procedures, control measures and other related rules (tool box talk strategy to be implemented). Posting appropriate signage regarding the dangers attached to the work and hazards identified must be posted at

strategic places for everyone to see and be included in the method statement to be provided in the health and safety plan.

2.3.9 Health and safety Representative(s) (applicable when 20 or more persons are employed)

The Principal Contractor and all Contractors shall ensure that Health and Safety Representative(s) are appointed under consultation and trained to carry out their functions. The appointment must be in writing. The Health and Safety Representative shall carry out regular inspections, keep records and report all findings to the Responsible Person forthwith and at health & safety meetings. The Client may request the appointment of a Health and Safety Representative if there are less than 20 employees on the construction site.

2.3.10 Health and Safety committees (applicable when 50 or more persons are employed)

The Principal Contractor shall ensure that project health and safety meetings are held monthly and minutes are kept on record meetings must be organized and chaired by The Principal Contractor's Responsible Person. All Contractors Responsible Persons and Health & Safety Representatives shall attend the monthly health & safety committees in accordance with the OHS Act 85/1993 and minutes of their meetings shall be forwarded to the Principal Contractor on a monthly basis.

2.3.11 Health and Safety Training/Induction

2.3.11.1 Induction

The Principal Contractor shall ensure that all site personnel undergo a risk-specific health & safety induction training session before starting work. A record of attendance shall be kept in the health & safety file. All visitors to the site shall also receive risk-specific health & safety induction training and a record of such shall be kept. All employees to be informed, instructed and trained by a competent person regarding the hazards and work procedures as prescribed.

2.3.11.2 Awareness

The Principal Contractor shall ensure that, on site, periodic toolbox talk take place at least once per week. These talks should deal with risks relevant to the construction work at hand. A record of attendance shall be kept in the health & safety file. All Contractors have to comply with this minimum requirement. The contractor shall inform all residence and or members of the public, who may be affected by the activities and who will most likely be exposed to the hazards identified of all precautionary measures to be taken.

2.3.11.3 Competency

All competent persons shall have the knowledge, experience, training, and qualifications specific to the work they have been appointed to supervise, control, carry out. This will have to be assessed on regular basis e.g. periodic audits by the Client, progress meetings, etc. The Principal Contractor is responsible to ensure that competent Contractors are appointed to carry out construction work.

2.3.11.4 Medical certificate of fitness

The Principal Contractor must ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3 of the Construction Regulations 2014.

2.3.11.5 Public and Site Visitor Health & Safety

Both the Client and the Principal Contractor have a duty in terms of the OHS Act to do all that is reasonably practicable to prevent members of the public and site visitors from being adversely affected by the construction activities.

The Principal Contractor shall ensure that every person working on or visiting the site, as well as the public in general, shall be made aware of the dangers likely to arise from site activities, including the precautions to be taken to avoid or minimise those dangers. A record of these inductions/briefings shall be kept in the Project H&S File in accordance with the Construction Regulations. Appropriate H&S notices and signs shall be posted up, but this shall not be the only measure taken. .
The construction site shall be suitably and sufficiently fenced off/ barricaded and or provided with controlled access points to prevent the entry of unauthorized persons.

2.3.12 General Record Keeping

The Principal Contractor and all Contractors shall keep and maintain Health and Safety (THE FILE) records to demonstrate compliance with this Specification, with the OHS Act 85/1993 , Construction Regulations (February 2014) and any other legislation applicable on site. The Principal Contractor shall ensure that all records of incidents/accidents, training, inspections, audits, etc, are kept in a health & safety file held in the site office. The principal Contractor must ensure that every Contractor opens its own health & safety file, maintains the file and makes it available on request. The Principal Contractor shall maintain an up to date register of each Contractor engaged in construction work on site giving the Contractors' name and the Responsible Persons' contact details and the number of employees on site. As these details may be subject to frequent change, the register must be updated at least weekly. The register is to be available for inspection

2.3.13 Health & Safety Audits, Monitoring and Reporting

The client will conduct at least, a once monthly Health & Safety audit of the work operations including a full audit of physical site activities as well as an audit of the administration of health & safety. The Principal Contractor is obligated to conduct similar audits or all contractors appointed by it. Detailed reports of the audit findings and results shall be reported on at all levels of project management meetings/forums. Copies of the Client audit reports shall be kept in the Primary Project Health & Safety File while the Principal Contractor audit reports shall be kept in their File, a copy being forwarded to the Client. Contractors have to audit their sub-contractors and keep records of these audits in their health & safety files, available on request. These audits must be conducted by a competent person.

2.3.14 PERMITS

Permits may be required for certain activities and these are not limited to but may include the following:

- Use of Explosives and Blasting
- Work for which a fall prevention plan is required
- Removal of asbestos materials.
- Disposal of (old type) fire detectors with radioactive elements.
- Decanting/handling of Ammonia.

If and where applicable, the Employer will issue to the Principal Contractor, permits and log books (which log books shall thereafter be kept up to date by the Principal Contractor), for the following installations:

- Boilers
- MV switchgear and chambers/rooms
- MV switchgear outdoor yards
- Lifts

All of the above are to be documented in the H&S plan

2.3.15 Lockout Systems - Electrical

A system of control shall be established in order that no unauthorized person can energize a circuit, open a valve, or activate a machine on which people are working or doing maintenance, even if equipment, plant or machinery is out of commission for any period, thus eliminating injuries and damage to people and equipment as far as is reasonably practicable.

Physical/mechanical lock-out systems shall be part of the safety system and included in training. Lockouts shall be tagged and the system tested before commencing with any work or repairs.

2.3.16 Emergency Procedures

The Principal Contractor shall prepare a detailed emergency procedure prior to commencement of work on site and it shall be included in, and form part of, the H&S plan. The procedure shall be updated whenever changes occur and it shall detail the emergency response plans. The emergency procedures shall not be limited to, but shall include, the following key elements:

- List of key competent personnel on site;
- Details of the nearest emergency services, including their physical addresses and phone numbers;
- Actions or steps to be taken in the event of each specific type of emergency;
- Information on hazardous materials/situations that may be encountered on site.

Emergency procedures shall include, but shall not be limited to, fire, spills, accidents to employees, use of hazardous substances, bomb threats, and major incidents/accidents.

A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc) must be maintained and be readily available to site

personnel at all times that there are persons on site i.e. it must not be located in an area which may be inaccessible outside of normal working hours.

The Principal Contractor shall advise the Client and the Engineer in writing forthwith, and thereafter at the project and H&S meetings, of any emergencies that occurred, together with a record of the action taken. Copies of all reports on emergencies shall be kept in the Project H&S File.

2.3.17 First Aid Boxes and First Aid Equipment

The Principal Contractor and all other Contractors shall appoint First Aider(s) in writing. All Contractors with more than 10 employees shall have a trained, certified First Aider on site at all times. The appointed First Aider(s) are to be sent for accredited first aid training. Copies of the valid First Aid certificates for each First Aider are to be kept in the Project H&S File. The Principal Contractor shall provide an on-site First Aid Station with First Aid facilities, including first aid boxes adequately stocked at all times. All Contractors with more than 5 employees shall supply their own first aid box(es).

2.3.18 Accident / Incident Reporting and Investigation

Injuries are to be categorized into first aid; medical; disabling; and fatal. The Principal Contractor must stipulate in its construction phase health & safety plan how it will handle each of these categories. When reporting injuries to the Client, these categories shall be used. All injuries shall be investigated by the Principal Contractor, with a report being forwarded to the Client forthwith. All Contractors have to report on the 4 categories of injuries to the Principal Contractor at least monthly. The Principal Contractor must report all injuries to the Client in the form of a detailed injury report at least monthly. The Client's agent must be informed forthwith of any recordable incident or accident.

2.3.19 Hazards and Potential Situations

The Principal Contractor shall immediately notify other Contractors as well as the Client's Agent of any hazardous or potentially hazardous situations that may arise during performance of construction activities. Hazards to be taken into account;

- **Machine Hazards,** (Moving machinery Machine running out of control. Machine coming in contact with operator or employees body parts etc.),
- **Energy Hazards,** (Live electricity underground overhead, portable generators and hand tools etc.),
- **Material Handling Hazards** (heavy loads and hot materials),
- **Work Practices Hazards,** (Working at heights and elevated positions, excavations tripping and falling, Plant and Tools, noise, Insects, Snakes, Ticks, Bees and ergonomics)
- **Moving Vehicle Hazards,** (Vehicles generating fumes and dust, unguarded machine parts and belts etc.),
- **Hazardous Chemical Hazards,** (Asbestos dust on ceilings, Asbestos containing materials, Lead dust, dust, Cement, mortar, concrete and other chemicals to be used)
- **Weather conditions.** (Extreme hot and cold weather conditions)

2.3.20 Personal Protective Equipment (PPE) and Clothing

The Principal Contractor shall ensure that all workers are issued (**free of charge**) and wear appropriate PPE ei, hard hats, safe Footwear, gloves, ear/ eye protection and overalls ect. Keep a record of the PPE issued, which must be signed by employees. The Principal Contractor and all Contractors shall make provision and keep adequate quantities of SABS approved PPE on site at all times. The Principal Contractor shall clearly outline procedures to be taken when PPE or Clothing is,

- Lost or Stolen;
- Worn out or damage

The above procedure applies to Contractors and their Sub-contractors, as they are all Employers in their own right.

The following items must be provided as a minimum requirement but shall not be limited to:

- Safety shoes and or gumboots with steel toes
- Overalls
- Eye protection,
- Approved and appropriate type Hearing protection when excessive noise is being generated,
- Approved and appropriate type of dust masks,
- Reflector vest.
- Rain suits (when working in rainy adverse weather)

2.3.21 Occupational health and Safety Signage

The Contractor shall provide adequate on-site OHS signage. Including but not limited to: 'Construction Site', 'no unauthorized entry', 'report to site office', 'site office', 'first aid facility', 'firefighting equipment' , 'mandatory ppe', Road traffic signage as per SARTM, Manual 13(where applicable), ect. Signage shall be posted at all entrances to site as well as on site in strategic locations e.g. access routes, entrances to structures and buildings, and other potential risk areas/operations (where and if applicable on the specific site and as directed by Client/ representative).

2.3.22 Contractors and Sub-contractors

The Principal Contractor shall ensure that all Contractors under its control comply with this Specification , the OHS Act of 1993, Construction Regulations (February 2014) , and all other relevant legislation that may relate to the activities directly or indirectly. The Contractor, when appointing other Contractors as 'Sub-contractors', shall mutatis mutandis ensure compliance and a section 37(2) agreements must be put in place.

2.4 Physical Requirements

2.4.1 Stacking of materials

The Principal Contractor and other relevant contractors shall ensure that there is an appointed staking supervisor and all materials, all equipment is stacked and stored safely in a demarcated area.

2.4.2 Speed Restrictions, Signage and Protection

The Principal Contractor shall ensure that all persons in its employ, all Contractors, and all those that are visiting the site are aware and comply with the site speed restriction(s).

Separate vehicle and pedestrian access routes shall be provided, maintained, controlled, and enforced. Signage shall be provided and should comply as per OHS Act and the South African Road Traffic legislation with specific reference to Manual 13

2.4.3 Hazardous Chemical Substances (HCS)

The Principal Contractor and other relevant Contractors shall provide the necessary training and information regarding the use, transport, and storage of HCS. The Principal Contractor shall ensure that the use, transport, and storage of HCS are carried out as prescribed by the HCS Regulations. The Contractor shall ensure that all hazardous chemicals on site have a Material safety Data Sheet (MSDS) on site and the users are made aware of the hazards and precautions that need to be taken when using the chemicals. The First Aiders must be made aware of the MSDS and how to treat HCS incidents appropriately.

2.4.4 Asbestos

The Principal Contractor shall ensure that the Asbestos Regulations R.155 10 February 2002 are complied with in respect of roof sheeting and other asbestos containing materials that are required to be demolished and or removed. All the required approvals and permits to be obtained from the prescribed authorities. An approved Asbestos contractor to be used for the demolition process.

2.4.5 Fall protection

The Contractor must ensure that:

A competent person is appointed who is responsible for the preparation, implementation and maintenance of the Fall Protection Plans.

Risk assessment must include all work carried out elevated positions, which will include procedures, and methods used to address the risks identified per location. Assessment of employee's physical and psychological fitness working at elevated positions. A training programme for workers working at elevated positions and records thereof.

A procedure outlining the Inspection, Testing and Maintenance of fall protection equipment.

The compliance of CR 10(4), and 10(5).

2.4.6 Excavation work.

A contractor must ensure that all excavation work is carried out under the supervision of a

competent person who has been appointed in writing for that purpose; and evaluate, as far as is reasonably practicable, the stability of the ground before excavation work begins. Comply with the rest of these regulations.

2.4.7 Demolition work.

A contractor must appoint a competent person in writing to supervise and control all demolition work on site.

A contractor must ensure that before any demolition work is carried out, and in order to ascertain the method of demolition to be used, a detailed structural engineering survey of the structure to be demolished is carried out by a competent person and that a method statement on the procedure to be followed in demolishing the structure is developed by that person. Comply with the rest of these regulations.

2.5 Plant and Machinery

2.5.1 Construction Plant and Machinery

“Construction Plant” includes all types of plant including but not limited to, fixtures, fittings, implements, equipment, tools and appliances, and also anything which is used for any purpose in connection with such plant cranes, piling rigs, excavators, road vehicles, and all lifting equipment etc.

The Principal Contractor shall ensure that all such plant complies with the requirements of the OHS Act 85/1993, Driven Machinery Regulations and Construction Regulations (February 2014). The Principal Contractor and all relevant contractors shall inspect and keep records of inspections of the construction plant used on site. Only authorized/competent persons are to use machinery under proper supervision. Appropriate PPE and Clothing must be provided and maintained in good condition at all times.

No unsafe or dangerous machinery, equipment, plant or tools may be brought onto, allowed or used on the construction site. The Client reserves the right to inspect any machinery, equipment, plant or tools at any time and prevents or prohibits its use, without any penalty to the Client and without affecting the contract in any way.

2.5.2 Vessels under Pressure (VUP) and Gas Bottles (when applicable)

The Principal Contractor and all relevant Contractors shall comply with the Pressure Equipment Regulations, including:

- Providing competency and awareness training to the operators;
- Providing PPE or clothing
- Inspect equipment regularly and keep records of inspections
- Providing appropriate firefighting equipment (Fire Extinguishers) on hand
- **Provided the compressed air lance with a dead man's handle or similar device to ensure that it does not injure any one when it is dropped accidentally when under pressure.**

2.5.3 Fire Extinguishers and Fire Fighting Equipment

The Principal Contractor and relevant Contractors must ensure all appropriate measures are taken to avoid the risk of fire shall provide adequate, regularly serviced firefighting equipment located at strategic points on site, specific to the classes of fire likely to occur. The appropriate notices and signs must be posted up as required. The fire equipment contemplated in previous paragraph is inspected by a competent person, who has been appointed in writing for that purpose, in the manner indicated by the manufacturer thereof and a sufficient number of workers are trained in the use of fire-extinguishing equipment;

2.5.4 Hot Works

A contractor must, in addition to compliance with the Environmental Regulations for Workplaces, 1987 and Construction Regulations 2014, ensure that welding, flame cutting and other hot work are done only after appropriate precautions have been taken to reduce the risk of fire;

2.5.5 Hired Plant and machinery

The Principal Contractor shall ensure that any hired plant and machinery used on site is safe for use. The necessary requirements as stipulated by the OHS Act 85/1993 and Construction Regulations (February 2014) shall apply. The Principal Contractor shall ensure that operators hired with machinery are competent and that certificates are kept on site in the health & safety file. All relevant Contractors must ensure the same.

2.5.6 Lifting Machines and Tackle (where and if required)

The Principal Contractor and all Contractors shall ensure that lifting machinery and tackle is inspected before use and thereafter in accordance with the Driven Machinery Regulations and the Construction Regulations (section 20). A competent lifting machinery and tackle inspector need to be appointed in writing and must inspect the equipment daily or before use, taking into account that:

- All lifting machinery and tackle has a safe working load clearly indicated;
- Regular inspection and servicing is carried out;
- Records are kept of inspections and of service certificates;
- There is a proper supervision in terms of guiding the loads that includes a trained banksman to direct lifting operations and check lifting tackle;
- The tower crane bases have been approved by an engineer;
- The operators are competent as well as physically and psychologically fit to work and in possession of a medical certificate of fitness to be available on site.

2.5.6 General Machinery

The principal Contractor and relevant Contractors shall ensure compliance with the Driven Machinery Regulations, which include inspecting machinery regularly, appointing a competent person to inspect and ensure maintenance, issuing PPE or clothing, and training those who use machinery.

2.5.7 Portable Electrical Tools and Explosive Powered Tools

The Contractor shall ensure that use and storage of all explosive powered tools and portable electrical tools are in compliance with relevant legislation. The Contractor shall ensure that all electrical tools, electrical distribution boards, extension leads, and plugs are kept in safe working order and comply with SANS 100142 and all other relevant codes of good practices. Regular inspections and toolbox talks must be conducted to make workers aware of the dangers and control measures to be implemented e.g. personal protection equipment, guards, etc.

The Contractor shall consider the following:

- A competent person undertakes routine inspections and records are kept;
- Only authorized trained persons use the tools;
- The safe working procedures apply;
- Awareness training is carried out and compliance is enforced at all times;
- PPE and clothing is provided and maintained
- A register indicating the issue and return of all explosive rounds;
- Signs to be posted up in the areas where explosive powered tools are being used.

2.5.8 High Voltage Electrical Equipment, underground, Overhead power lines (where and if required) and Electrical installations.

Care shall be taken when working close to, over or under high voltage reticulation power lines or cables. Underground services to be identified beforehand and the layout of such to be included in the contractor's Health and Safety Plan. A safe work procedure to be drawn up and included into contractor's Health and Safety Plan.

2.5.9 Electrical Installations and Works

Electrical installation work (by definition: "installation work" means

- (a) the installation, extension, modification or repair of an electrical installation;
- (b) the connection of machinery at the supply terminals of such machinery; or
- (c) the inspection, testing and verification of electrical installations for the purpose of issuing a certificate of compliance;

shall be carried out by competent persons, and controlled by a competent person (Registered Person) that has been appointed to do so in writing, in accordance with Electrical Installation Regulations and the Electrical Machinery Regulations.

Temporary electrical installations shall be inspected at least once per week by a competent person and a record of the inspections kept in the Occupational Health & Safety File.

The Contractor shall ensure that:

- existing electrical services are located and marked before construction commences and during the progress thereof. Where this is not possible, workers with jackhammers etc. are to be protected against electric shock by the use of suitable protective equipment like insulated handles, rubber mats etc.

- electrical installations and -machinery are sufficiently robust to withstand working conditions on site.
- all electrical machinery used on site is inspected before start-up on a daily basis by a competent person and that a record of the inspection is kept in the Occupational Health & Safety File.

A system of control shall be established in order that no unauthorized person can energize a circuit, open a valve, or activate a machine on which people are working or doing maintenance, even if equipment, plant or machinery is out of commission for any period, thus eliminating injuries and damage to people and equipment as far as is reasonably practicable.

Physical/mechanical lock-out systems shall be part of the safety system and included in training. Lockouts shall be tagged and the system tested before commencing with any work or repairs.

This lock-out procedure shall be adhered to by all Contractors on site.

The guidelines and conditions provided in internal **Municipal Operating Regulations for High Voltage systems (EII/21/NT)** attached documents form an integral constituent of the Health and Safety Specifications. It is therefore a condition of acceptance that no Health and Safety Plan shall be complete unless all relevant elements of this document applicable to the above project have been included in the Health and Safety Plan. (**ALL Municipal Operating Regulations for High Voltage systems (EII/21/NT) apply**)

Safety and switching procedures for Electrical Installations

1 REGULATIONS AND DEFINITION OF COMPETENT PERSON:

1.1 REGULATIONS:

All persons who carry out or arrange for work of any description for the Department in connection with electrical apparatus shall make themselves acquainted with the Occupational Health and Safety Act (Act 85 1993) with particular reference to the Electrical Machinery Regulations, Regulations 1 to 23 inclusive.

Access to the above Act and its Regulations can be arranged with the Regional Manager.

1.2 DEFINITION OF COMPETENT PERSON:

“competent person” in relation to machinery, means any person who—

- (a) has served an apprenticeship in an engineering trade which included the operation and maintenance of machinery, or has had at least five years' practical experience in the operation and maintenance of machinery, and who during or subsequent to such apprenticeship or period of practical experience, as the case may be, has had not less than one year's experience in the operation and maintenance appropriate to the class of machinery he is required to supervise;

- (b) has obtained an engineering diploma in either the mechanical or electrotechnical (heavy current) fields with an academic qualification of at least T3 or N5, or of an equivalent level, and who subsequent to achieving such qualification has had not less than two years' practical experience in the operation and maintenance appropriate to the class of machinery he is required to supervise;
- (c) is a graduate engineer and has had not less than two years' post-graduate practical experience in the operation and maintenance appropriate to the class of machinery he is required to supervise and who has passed the examination on the Act and the regulations made there-under, held by the Commission of Examiners in terms of regulations E5 (2) of the regulations published under Government Notice R.929 of 28 June 1963; or
- (d) is a certificated engineer;

2 SAFETY EQUIPMENT

The following equipment required for working on electrical installations and distribution systems, must be maintained in good order and repair and must be made available:-

Safety belt, overalls, hard hat, safety shoes or boots, rubber gloves, "Men Working" notice boards, locks for locking off switches, buss bar shutters in truck-type switchgear, isolators or earthing links, rubber sheet and length of rope with short circuiting earthing-chains, earthing sticks and testing/phasing sticks rated for the voltage of the equipment to be tested.

Under no circumstances shall work be carried out on electrical apparatus unless the proper safety equipment is used

With regard to overhead linesmen, no work shall be carried out unless use is made of a non-metallic ladder and the appropriate safety belt, rubber gloves, overalls, hardhat and safety shoes or boots are worn. The buddy system must also be implemented.

3 DEFINITION OF OPERATING TERMS

3.1 Alive or live

This means electrically connected to the power system and/or electrically charged.

Consider an isolated overhead line that is not earthed. An overhead line can be electrically connected to the system in the following ways:

- (a) By means of a metallic conductor such as links and breakers or switches. This is the normal way of transmitting electrical energy.
- (b) Electromagnetic induction or transformer action from a nearby current carrying line will induce a dangerous voltage in the isolated lines and are a hazard to all personnel that must work on or with the line.

- (c) Electrostatic induction or condenser action from a nearby live line will induce a dangerous voltage in any isolated, but not earthed, overhead line.
Electrically charged means at a potential difference or voltage above zero

3.2 Dead

This means that any apparatus so described is isolated from the power system. Rotating plant shall not be regarded as dead until it is stationary or is being slowly rotated by means of barring gear and is not excited.

The Occupational Health and Safety Act defines dead as: "dead" means at or about zero potential and isolated from any live system. Disconnected has the same meaning as isolated. An overhead line disconnected from all sources of supply but not earthed, cannot be regarded as dead because:

- (a) It can retain a static charge.
- (b) It can acquire a static charge due to atmospheric conditions.
- (c) It can accidentally be made alive.
- (d) Nearby lines continually induce voltage in them.

The regulations recognise only the following devices as disconnects or isolators:-

- (a) Links.
- (b) Fuses.
- (c) Truck type switchgear.

3.3 Earthing

This means the connecting of apparatus electrically to the general mass of earth in such a manner as will ensure at all times an immediate safe discharge of electrical energy. This is done through an earth bar or spike by means of a good metallic conductor.

To fully appreciate this definition we must refer to the Electrical Machinery Regulations, Regulation 3 of the Occupational Health and Safety Act which states:

"Work on Disconnected Electrical Machinery. —Without derogating from any specific duty imposed on employers or users of machinery by the Act, the employer or user shall, whenever work is to be carried out on any electrical machinery which has been disconnected from all sources of electrical energy but which is liable to acquire or to retain an electrical charge, as far as is practicable, cause precautions to be taken by earthing or other means to discharge the electrical energy to earth from such electrical machinery or any adjacent electrical machinery if there is danger if there is danger therefrom before it is handled and to prevent any electrical machinery from being charged or made live while persons are working thereon."

Electrical apparatus and in particular overhead lines may become charged due to:-

- (a) Direct lightning strokes.
- (b) Electro magnetically induced currents due to a lightning stroke in the immediate vicinity of the line.
- (c) Electro statically induced charges on the lines due to the presence of thunderclouds.
- (d) Electrostatic charges imparted to the line by the friction of dust or snow blowing past the conductors.
- (e) Electrostatic charges imparted to the line due to changes in line altitude"

These changes are responsible for tremendously high voltages between overhead lines and earth, in fact, sometimes high enough to cause a flash over on insulators. A spark may span several centimetres of air to a person's hand should he approach too closely to an isolated unearthed overhead line.

An overhead line or apparatus can be made alive by:

- (a) Unauthorised operating, i.e., closing the wrong links and breaker.
- (b) Faulty wiring on consumer's stand-by sets. (Back feed from consumer)
- (c) A broken overhead conductor from a different line falling onto the isolated line.
- (d) Synchronising plugs.

From the foregoing paragraphs it is clear that the purpose of earthing isolated lines and apparatus are:

- (a) To discharge them should there be a residual voltage or charge.
- (b) To prevent them acquiring a static charge.
- (c) To prevent danger to persons working on apparatus in the event of someone accidentally making it alive.
- (d) To dissipate induced voltages continuously and safely.

Earthing gear means the fixed or portable appliances used for earthing electrical apparatus.

The dangers from inadequate or improper earth connections are:

- (a) Electrocution.
- (b) Burns from arcing.

- (c) Electric shock leading to falls.

Earthing may be done by the closing of earthing links, or by the attaching of fixed earthing devices or by the affixing of portable earthing straps. In each case the main idea is to ensure the safety of personnel.

In affixing portable earth straps, the connection to the earthbar or earthed metal or spike must be made first and in removing such earthing straps, the disconnecting from the earthbar or earthed metal or spike must be done last. Also, a link stick or an insulated stick should be used to connect the earth wires to the overhead lines or apparatus.

These requirements are most important because connecting the portable strap first to earth and then to the conductors by means of a link stick avoids the risk of a shock to the operator from static charges or induced voltages.

REMEMBER: Always safety test before applying earths.

3.4 Isolate

This means to disconnect from all Sources of electrical potential by means of opening of links or fuses or the withdrawal of truck-type circuit-breakers.

All sources of electrical potential mean all points or circuits from where the apparatus can be made alive. Links, fuses and truck-type switchgear can be regarded as isolators because:

- (a) They leave a visible air gap in a circuit when open, removed or withdrawn.
- (b) They contain no stored energy and will not close due to defects.
- (c) They can be locked in a physical condition and thus can only be operated by the person with the correct key.

Opening links and locking them in the open position; removing fuses and locking them away; withdrawing truck-type switchgear and locking the buss bar shutters are the only safe methods of isolating.

3.5 Circuit Breaker

This is a device designed to make or break electric current under normal and fault conditions. A breaker can make or break an electric current because it is designed to extinguish the arc very rapidly and effectively. It is also designed to withstand the tremendous forces under short circuit conditions. The arc-extinguishing medium for high-voltage breakers is normally air, oil or vacuum and should this medium be lost, the breaker becomes a link. Never use a breaker without an arc-extinguishing medium to interrupt current flow because the breaker will probably explode or it will sustain severe damage.

A fault condition is any condition that will cause an excessive amount of current flow. The normal fault conditions are:

- (a) Phase faults.
- (b) Earth faults.

- (c) Open circuit in one line of a three-phase system (Single-phasing).
- (d) Too low a voltage. (Motors will draw a large current or even stall).
- (e) Too high a voltage.
- (f) Overloading.

For the following reasons breakers cannot be regarded as isolators:

- (a) They leave no visible gap in a circuit.
- (b) They contain stored energy and can close on their own due to various defects.
- (c) It is normally not possible to lock them in an open position.
- (d) Oil circuit-breakers are subjected to carbon tracking which could cause a flash-over between contacts.

3.6 Link

This is a device for making or breaking a circuit when no load current is flowing.

Links differ from breakers and switches in the following respects:

- (a) They are not equipped with an arc extinguishing medium/device.
- (b) Their movement is very slow.

Should current be interrupted by means of links, an uncontrollable arc will be struck at the points where the contacts part.

The temperature of the arc is so high (+ 2 000°C) that it will simply melt the parting contacts. As the contacts move further apart, the arc will lengthen and burn everything away. Molten metal could splash onto the operator and cause severe injuries.

As the arc lengthens, considerable noise is generated and the light intensity is so severe that the operator could suffer from "welding flash" of the eyes.

When apparatus equipped with earthing links is required to be earthed at more than one place, the earthing links shall always be closed first and thereafter, any necessary portable earthing gear may be affixed to the apparatus.

In removing the earths in readiness for making the apparatus alive, all portable earthing gear shall first be removed and earthing links shall be opened last.

Closing the earthing links first ensures maximum safety to the operator. These links are easily operated, make good contact and the operating handles are at a safe distance from the contact points.

Locks and keys shall also be provided for links. The operating mechanism of all manually operated links shall be fitted with fastenings for locks. The operating mechanisms of each set of manually operated links shall normally be locked whether the links are in the open or in the closed position.

The locking of links provides a safeguard against their being opened or closed in error by other persons apart from the one with the correct key and a written instruction to operate.

3.7 Operating methods

This means switching, linking, safety testing and earthing. This definition also indicates the order of operating when making apparatus safe to work on.

- (a) Switching -
 - (i) Open breaker or switch to interrupt current flow safely, i.e. prevent arcs.
 - (ii) Close breaker or switch to start current flow - the only safe way.
- (b) Linking - open at least one set of links from where the apparatus can be made alive and lock the links in the open position. Always ensure that you are not going to start or interrupt current flow with the links by ensuring that the breaker or switch is open.
- (c) Safety test - test all three phases to ensure that the apparatus is disconnected from all sources of supply and that there is no back-feed from a consumer's standby set or other source.
- (d) Apply earths - ensure safety of the workers by:-
 - (i) Discharging the line or apparatus.
 - (ii) Preventing the line from acquiring a static charge.
 - (iii) Preventing the line or apparatus from being accidentally made alive.

Before applying portable earths, ensure that they are mechanically and electrically in good condition. There should be no broken strands, the clamps should be rigid and without defect and when applied properly, should make intimate contact with the conductors and earthbar or spike. The earthing cable tails should be as short as possible. The current carrying capacity of the portable earth is greatly reduced by broken strands. It will act as a fuse and increase the danger to workmen.

4 GENERAL SAFETY PRECAUTIONS

No person shall carry out work of any description (including maintenance, repairs, cleaning and testing) on any part of electrical apparatus unless such parts of the apparatus are:

- (a) dead;
- (b) disconnected, isolated and all practicable steps taken to lock off from live conductors;

- (c) efficiently connected to earth with the appropriate earthing sticks or gear designed for this purpose at all points of disconnection of supply;
- (d) screened where necessary to prevent danger, and caution and danger notices fixed;

and unless such person is fully conversant with the nature and extent of the work to be done.

It is the duty of the competent person in charge of the work to ensure that the foregoing provisions are complied with. He shall also ensure that when the work has been completed, the apparatus is safe to be made alive and that all earths and temporary danger notices have been removed.

Provided that cleaning and painting of earthed metal enclosures, connections or disconnections of circuits to or from live systems may be carried out in accordance with instructions issued by the competent person concerned.

Provided also that where the design of the apparatus precludes the strict compliance with all details of these precautions, the work shall be carried out to the instructions of the senior competent person present.

When any person receives instructions: regarding work on or the operation of high voltage apparatus he shall report any objection to the carrying out of such instructions to the competent person who shall have the matter investigated and, if necessary, referred to higher authority.

5 ACCESS TO HIGH VOLTAGE ENCLOSURES AND APPARATUS

Enclosures, chambers, cubicles or cells containing high voltage conductors shall be kept locked and shall not be opened except by a competent person.

6 SWITCHING:

- (a) No switching shall be carried out without the sanction of the appropriate competent person except for agreed routine switching or in cases of emergency.

All telephone instructions/messages relating to the switching operation shall be written down and be repeated in full to the sender to ensure that the message has been accurately received.

- (b) When a switch shows any sign of distress after operating, its condition shall be immediately reported to the appropriate competent person, and it shall be examined before further operation.
- (c) The examination of and necessary adjustments including inspection and/or changing of oil of any high voltage oil immersed circuit-breaker which has operated under fault conditions shall be carried out if possible before the circuit-breaker is re-closed, or at the earliest available opportunity thereafter.

7 WORK IN SUBSTATIONS AND SWITCHING STATIONS CONTAINING EXPOSED LIVE CONDUCTORS.

7.1 Safety Clearances to Live Conductors:

Unless the whole equipment is "dead", the section which is made dead for work to be carried out shall be defined by the use of barriers or roping such that the minimum clearance from the nearest exposed conductor to ground level or platform or access way shall be:-

Rated Voltage	Clearance
Up to 11 kV	3.0 m.
From 11kV to 33kV	3.4 m

The area at ground level shall be only that in which the work is to be carried out.

7.2 Insufficient Clearances

If the above clearances are not sufficient to avoid danger, other suitable arrangements shall be made to provide the requisite degree of safety.

7.3 Ladders and Other Long Objects

Ladders and other long objects shall not be used without the permission of the senior authorised person in charge of the work and the movement and erection of such ladders shall be under his/her direct supervision at all times.

8 WORK ON METAL CLAD SWITCHGEAR SPOUTS:

- (i) The section of bus bars on which work is to be carried out shall be made dead and isolated from all points of supply.
- (ii) The shutters of live spouts shall be locked closed.
- (iii) The busbars shall be earthed with approved earthing equipment if possible, at a panel other than that at which work is to be carried out. Temporary earths shall in any case be applied to all phases on the busbar at the point of work. These earths may then be removed one phase at a time for work to be

carried out. Each phase earth shall be replaced before a second phase earth is removed.

For the earthing of metal clad switchgear, approved appliances only shall be used. The insertion of the hand or any other tool in contact spouts for this purpose is forbidden.

9 WORK ON TRANSFORMERS:

When work is carried out on transformers, both the primary and secondary switches and isolators shall be opened. The transformer shall also be isolated from all common neutral earthing equipment from which it may become live. This does not require the disconnection of solidly earthed neutrals.

10 WORK ON CABLES, CONDUCTORS AND OVERHEAD LINES:

10.1 Cables and Conductors

- (a) No person shall touch the insulation, which covers or supports any high voltage conductor unless the conductor is dead and earthed.
- (b) Before carrying out work involving cutting into a high voltage cable, the responsible person shall satisfy himself that the cable has been made dead, isolated and earthed where practicable and identified. In all cases of doubt, the cable shall be spiked in an approved manner.

10.2 Overhead Lines

- (a) All persons while at work on towers, poles and high structures or when working on live lines shall make proper use of their safety belts and safety equipment, and no man shall work alone at any tower or high structure, or on live equipment.
- (b) The senior authorised person in charge of the work shall satisfy himself that the line conductors are short circuited and earthed before work is commenced. When work has been completed, the responsible person shall ensure that all temporary earths have been removed and that the line is safe to be made alive.
- (c) When work is carried out on a high voltage line, earths shall be placed at the point or points where the work is being done in addition to the earths provided at the points of disconnection.
- (d) In the event of the near approach of a lightning storm, all work on overhead lines shall cease immediately and the authorised person in general charge of the work shall be informed.
- (e) For the safety of the public, strain insulators shall be placed in all stays on overhead lines.

EMERGENCY FIRST AID, RESCUE AND RESUSCITATION IN THE CASE OF ELECTRIC SHOCK

1. **FIRST AID:**

1.1 Burns:

Treat with Vaseline to exclude air.

1.2 Shock:

In addition to suffering from electric shock, it is also probable that the patient will be suffering from physical shock and important that this condition be treated.

The patient must be kept warm with blankets and/or coats, and if available, hot water bottles should be applied to the feet.

1.3 Drinks:

Drinks must on no account be administered unless the patient is fully conscious.

Alcoholic drinks should not be administered unless recommended by a doctor.

2. **RESCUE**

The procedure to rescue persons from contact with a live conductor cannot definitely be laid down for all cases. However, certain principles and methods are outlined which all persons working on electrical apparatus or assisting in such work should know.

3. **RELEASES FROM CONTACT WITH LIVE CONDUCTORS**

3.1 Low voltage

- (a) Observe quickly the general circumstances of the case, whether special difficulties are involved and if special precautions are necessary. Every second is precious and delay may be fatal; be prepared, therefore, to act promptly. Speed of action must be accompanied with due care.
- (b) Take precautions against receiving a shock your self. Remember that the patient, until released, is electrified at the same voltage of the live conductor.
- (c) In cases where the contact has been made on a live conductor with adjacent switch control, the switch should be opened immediately and then the patient pulled clear. If in doubt about which switch to open, all switches should be opened; but assume all conductors are still alive unless some method is available to determine that the conductors are dead.
- (d) When conductors cannot be de-energised immediately by adjacent switch control, the procedure will depend on the voltage of the live conductor.

In all cases it is necessary for the rescuer to be adequately insulated against shock from a conductor to earth and against shock from a conductor to conductor, or by touching the patient.

For low and medium voltage (up to 650 V) rubber gloves, rubber sheeting or dry cloth, including loose portions of the patients clothing, provide adequate insulation for the rescuer's hands. The use of such insulating guards should always be aimed for; but a dry pole with no associated earthed metal on it provides adequate insulation for the rescuer against shock from a conductor (or patient's body to earth).

- (e) Cutting away a conductor (carrying up to 650 V only) may provide a quick and easy method of release in some cases. It is useful especially when delay might otherwise occur in releasing the patient. This method requires that the rescuer has sound knowledge of what he/she is doing.
- (f) Prevention of patient falling from aloft; when a patient is being rescued above ground level, care must be taken to ensure that he does not fall from a dangerous height when pulled clear or when conductors are de-energised.
- (g) Be prepared to use considerable force when releasing a patient who is holding a live conductor. Punch the wrist heavily on the inner side or strike the back of the hand. It may be easier in some cases to use one's foot to force the patient's hand clear.

3.2 High voltage

For high voltage it is necessary to put an extra long, say 2 m or more, dry insulating material, such as wood or rope, between the rescuer's hands and the patient to enable the patient to be pushed or pulled clear of the conductor, or enable the conductor to be cleared from the patient.

4. **RESUSCITATION AFTER CONTACT WITH LIVE CONDUCTORS**

Immediately after rescue, a rapid but careful examination of the patient must be made to determine the extent of treatment necessary.

Electric shock may cause breathing to stop because of a sudden paralysis of the respiratory centre and it may also cause a failure of the circulation because the shock has affected the heart.

The method of resuscitation will therefore depend on the patient's condition.

4.1 Patient breathing

If the patient is breathing and his heart is beating then in a large majority of cases recovery will be rapid.

Do not apply artificial respiration if the patient is breathing. Let the patient have plenty of fresh air. If the patient is in a collapsed condition, lay him on his back in as comfortable a position as practicable with his head tilted slightly back. This will keep his airway open and assist breathing. A pad, if available, placed under the patient's shoulders will assist in keeping his head back. Loosen any tight clothing.

4.2 Patient not breathing

If breathing has stopped or is very weak or appears to be failing, commence artificial respiration without delay.

4.3 Circulation

In cases of electric shock, failure of the heart should be suspected if the patient does not quickly show some response to artificial respiration. Circulation should be assessed within fifteen seconds after the commencement of artificial respiration.

Feel for a pulse in one of the carotid arteries in the patient's neck. This is done with the pads of the fingers at the level of and at either side of the Adam's apple. Do not feel both carotid arteries at the same time, as this would stop the flow of blood to the brain. If the heart is beating, a pulse will be felt.

If no pulse is felt, lift the patient's eyelids. If the heart is not beating the pupils of the eyes will be large and will not become smaller when exposed to light by the lifting of the eyelids. If the heart is beating the pupils will become smaller when exposed to the light.

The absence of a pulse in the carotid artery and the enlarged pupil of the eye, which does not become smaller when exposed to light, indicate that the heart has stopped beating.

(a) Patient's heart beating. Do not apply external cardiac (heart) massage when a pulse can be felt.

(b) Patient's heart not beating. If the heart has stopped beating commence external cardiac (heart) massage without delay.

4.4 General

Immediately resuscitation is commenced, send for medical assistance and an ambulance and notify the hospital if applicable.

If the patient is not breathing and his heart has stopped beating, artificial respiration by the expired air method should be carried out in conjunction with external cardiac (heart) massage.

Every second you wait can cause severe brain damage through lack of blood and oxygen.

Artificial respiration and external cardiac (heart) massage must be commenced without delay and should be continued until breathing is restored and the heart starts beating or until a doctor advises that further efforts will be of no avail.

Care should be taken to avoid, as far as possible, aggravating any injuries the patient may have sustained.

4.5 Artificial respiration

If available in order to reduce the risk of infection it is recommended that a facemask or shield be used for both mouth to mouth or mouth to nose artificial respiration. However, time should not be lost in getting a face mask/shield.

Examples of Masks



Alternatively a clean cotton handkerchief can be used to cover the mouth.

It is not necessary to be highly trained in resuscitation methods to carry out artificial respiration effectively.

Simply stated, artificial respiration is a means of supplying oxygen to the patient's lungs, and thus,

through the blood, to his brain to keep him alive while his own breathing is suspended.

The expired air method of artificial respiration is recommended as the best universally applicable

field type of artificial respiration.

For artificial respiration the patient's head must be kept well back to ensure a free passage to the

lungs. Exact rhythm and timing in carrying out artificial respiration are unimportant. The only

purpose of artificial respiration is to get oxygen into the patient's lungs.

Artificial respiration must be continued until breathing is restored or until a doctor advises that

further efforts will be of no avail.

4.5.1 Expired air artificial respiration

In the expired air method of artificial respiration the rescuer breaths his own exhaled breathe into the patient's lungs.

The normal air we breathe in contains 20 per cent oxygen. The air we exhale contains about 16 per cent oxygen and this is ample to keep the oxygen content in the patient's blood normal if it is breathed into him at about the rate of normal breathing.

Therefore, quickly ensure that the patient's throat is free from foreign matter. Next place him on his back and tilt the head well back (Fig.A1.1) this ensures an open passageway to the lungs. Placing a pad under the patient's shoulders will make the tilting of the head easier. However, time should not be lost in getting a pad.

The rescuer may then breathe into the patient's mouth or nose.

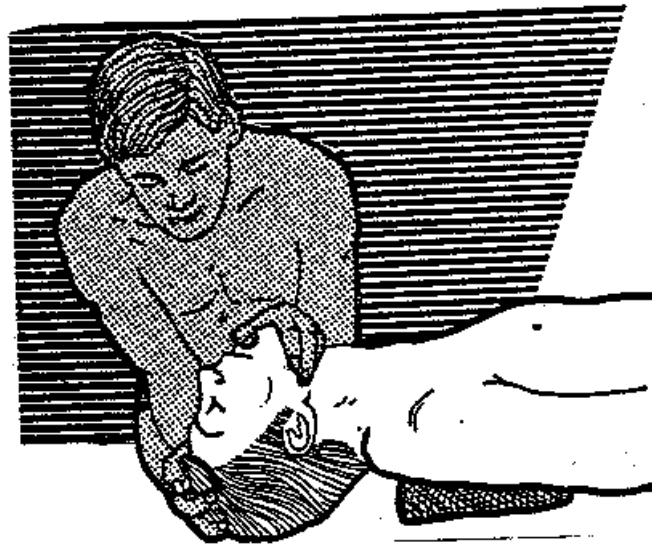


Figure A1.1

Lift the neck and tilt the head back. Hold the head tilted so that the skin over the throat is stretched tight. With one hand push the crown of the head down, remove the other from below the neck and use it to pull up the chin. This prevents the tongue from causing an obstruction.

4.5.2 Mouth-to-mouth method

The patient's head is tilted well back as in Figure A1.1 his mouth is opened and the rescuer opens his mouth wide and makes an air-tight seal around the patient's mouth as shown in Figure A.1.2. The rescuer's cheeks will normally seal the patient's nostrils, but if necessary the nostrils must be pinched closed with the fingers. The rescuer then breathes into the patient. The resistance to the rescuer's breath is about the same as that experienced when blowing up a balloon. The chest should be seen to rise.

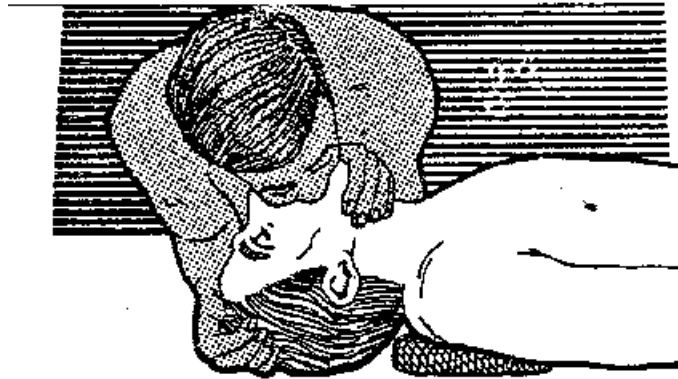


Figure A1.2

Seal your lips widely around the victim's mouth. Fold his lower lip down to keep his mouth open during inflation and exhalation. To prevent leakage, press your cheek against his nostrils during inflation. Blow air into the victim until you see the chest rise. Then remove your mouth to let him breathe out. Take your next breath as you listen to the sound of his breath escaping. Re-inflate his lungs as soon as he has exhaled.

Having breathed into the patient's lungs, the rescuer removes his mouth and, turning his face to one side to avoid the patient's exhaled breath, takes another deep breath and again breathe into the patient's lungs. This is kept up at a steady rate of from ten to fifteen times per minute.

One rescuer can take over from another. Remember rhythm and timing are not important but the patient must under no circumstances be left without air for longer than a minute.

4.5.3 Mouth-to-nose method:

The patient's head is tilted well back as in Figure A1.1. The rescuer opens his mouth and places it right over the patient's nose making an airtight

contact (Figure A1.3) The lips do not contact the nostrils as this would tend to close them. The patient's mouth is held closed and the rescuer breathes into his patient as in the mouth-to-mouth method.

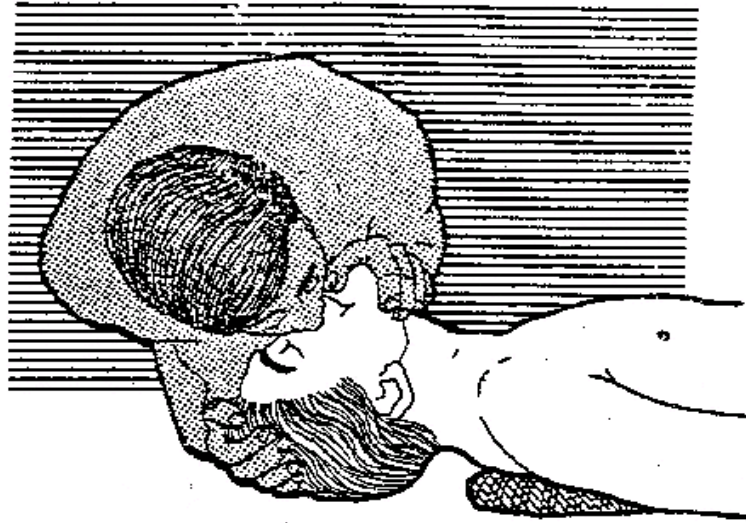


Figure A1.3 ~ Mouth-to-nose method

4.5.4 Filling the lungs:

The rescuer blows steadily and firmly, not with a jerk, and the patient's chest should be seen to rise. If air does not appear to be entering the lungs, quickly look for any blockage in the air passage, check the head again, making sure the jaw is well forward and the head tilted well back, and commence blowing again.

About ten good quick breaths should first be breathed into the patient as soon as he is reached. This will oxygenate his blood and give the rescuer a minute or so to get his patient into a more convenient location for continuing artificial respiration, for example, to lower a linesman from a pole.

5. **EXTERNAL CARDIAC (HEART) MASSAGE**

The lives of people whose hearts have ceased to function can often be saved by the prompt application of a form of resuscitation known as external cardiac (heart) massage (for example, massage of the heart without opening the chest). This massage may be performed by anyone.

The heart is in the centre of the chest between the breast-bone and the spine and if pressure is applied to the lower half of the breast-bone, the heart is compressed and the blood is squeezed out of it into the arteries. When the pressure is released the

breast-bone springs back into place, the heart, like a rubber ball, resumes its shape and in so doing allows blood from the veins to enter. Valves in the heart prevent blood flowing back into the heart from the arteries.

In this way a heart which has either stopped beating altogether or which has gone into ventricular fibrillation (a state of ineffective quivering often caused by electric shock) can be made to circulate the blood.

This compressing and releasing of pressure on the heart carried out rhythmically at a rate of approximately 60 compressions per minute is called external cardiac (heart) massage. It can keep a person alive if breathing is maintained, until his heart resumes its proper beating. A heart in ventricular fibrillation will require hospital treatment to restore normal heartbeat, but the heart can be made to circulate blood by external cardiac (heart) massage until the necessary medical aid is obtained.

It is desirable that adequate training in external cardiac (heart) massage be given to develop the technique. This can best be achieved with a training aid.

5.1 Technique:

Lay the patient on his back on a firm surface.

Feel for the notch at the top of the breast-bone (sternum) with one hand and for the lower end with the other. It is on the lower half of this bone that the pressure has to be made (see Figure A1 4)

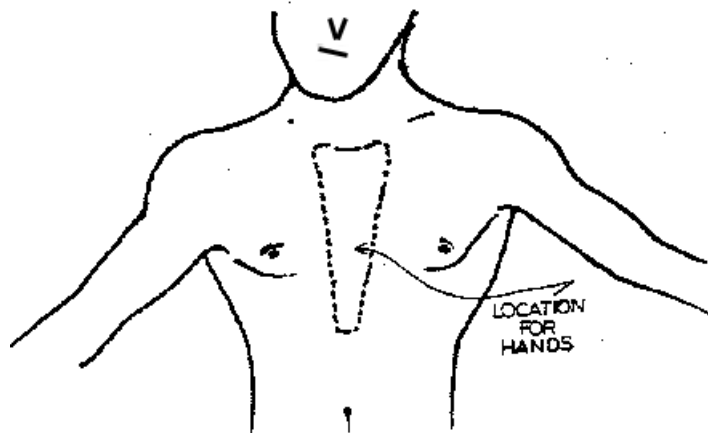


Fig A1.4: Location of the rescuers hands for external cardiac (heart) massage.

The rescuer leans directly over the patient and places the heel of one hand (either hand) on the lower half of the patient's breast-bone and places the heel of his other hand on the back of the first (one hand for a child' two fingers for an infant). The fingers should not press on the patient's chest as this would reduce the effectiveness of the pressure on the heels of the hands.

Keeping the arms straight, the rescuer presses down sharply and firmly to depress the patient's breast-bone from 30 to 50 mm in the case of an adult, depending on his build. Immediately release the pressure to allow the chest wall to recoil. If the technique is correctly applied it will not damage the patient's ribs.

If the patient is not breathing, external cardiac (heart) massage will be of no avail unless artificial respiration (expired air method) is carried out at the same time.

If only one rescuer is available, two breaths are given by the expired air method followed by fifteen chest compressions at the rate of approximately one per second.

Where two rescuers are available, one breathes into the patient and the other gives five chest compressions between each chest inflation. The rescuer giving the breaths should also feel for the pulse in the patient's carotid artery during resuscitation.

The chest should not, of course, be compressed at the same time as it is being inflated.

2.5.10 Night Work and Working hours (where and if required)

All work shall be done during normal working hours, unless agreed otherwise in writing.

The Principal Contractor must ensure that adequate lighting is provided to allow for work to be carried out safely. Permission to be obtained from the Client to work at night.

2.5.11 Transport of Workers

The Principal Contractor and other Contractors shall not:

- Transport persons together with goods or tools unless there is an appropriate area of section to store them and all loose tool and plant are tied down and secured;
- Transport persons in a non-enclosed vehicle, e.g. truck; there must be a proper canopy (properly covering the back and top) with suitable sitting area. Workers shall not be permitted to stand or sit at the edge of the transporting vehicle.
- Transport workers in bakkies unless they are closed/ covered and have the correct number of seats for the passengers.

2.5.12 Scaffolding (if applicable)

A contractor must appoint a competent person in writing who must ensure that all scaffolding work operations are carried out under his or her supervision and that all scaffold erectors, team leaders and inspectors are competent to carry out their work.

A contractor using access scaffolding must ensure that such scaffolding, when in use, complies with the safety standards incorporated for this purpose into these Regulations under section 44 of the Act.

2.6 Occupational Health

2.6.1 Occupational Hygiene

The contractor shall ensure that suitable housekeeping is continuously implemented on each construction site, including provisions for the—

- (i) proper storage of materials and equipment; and
 - (ii) removal of scrap, waste and debris at appropriate intervals;
- (b) loose materials required for use, are not placed or allowed to accumulate on the site so as to obstruct means of access to and egress from workplaces and passageways;
 - (c) waste and debris are not disposed of from a high place with a chute, unless the chute complies with the requirements set out regulation 12(6); and
 - (d) construction sites in built-up areas, adjacent to a public way are suitably and sufficiently fenced off and provided with controlled access points to prevent the entry of unauthorised persons.

2.6.2 Welfare Facilities

A contractor shall, depending on the number of workers and the duration of the work, provide at or within reasonable access of every construction site, the following clean and maintained facilities:

- (a) at least one shower facility for every 15 workers;
- (b) at least one sanitary facility for every 30 workers;
- (c) changing facilities for each sex; and
- (d) sheltered eating areas.

A contractor shall provide reasonable and suitable living accommodation for the workers at construction sites which are remote from their homes and where adequate transportation between the site and their homes, or other suitable living accommodation, is not available.

2.6.3 Alcohol and Other Drugs

An employer or a user, as the case may be, shall not permit any person who is or who appears to be under the influence of intoxicating liquor or drugs, to enter or remain at a workplace.

- 2. No person at a workplace shall be under the influence of or have in his possession or partake of or offer any other person intoxicating liquor or drugs.
- 3. An employer or user, as the case may be, shall in the case where a person is taking medicines, only allow such person to perform duties at the workplace if the side effects of such medicine do not institute a threat to the health or safety of the person concerned or other persons at such workplace.

2.7 Copy of the Act and Regulations

Every employer with five or more persons in his employ shall have a copy of the Act and the relevant regulations readily available at the work place: Provided that, where the total number of employees is less than five, the employer shall, on request of an employee, make a copy of the Act available to that employee.

2.8 Other Acts and Laws that may apply

The contractors attention is directed to the following Acts that may be applicable and must be adhered to at all times. It is the contractor's responsibility to become conversant with the requirements applicable in these laws:

- Compensation for Occupational Injuries and Diseases ACT 130 of 1993,**
- Mineral Act No. 50 of 1991,**
- Water Act No. 54 of 1956, and**
- Atmospheric Pollution Prevention Act No. 45 of 1965,**
- Occupational Health and Safety Act No. 85 of 1993,**
- Environmental Conservation Act No. 73 of 1989.**
- Hazardous Substances Act No.15 of 1973,**
- National Building Regulations and Building Standards Act No.103 of 1977,**
- National Environmental Management Act No. 107 of 1998,**
- National Road Traffic Act No. 93 of 1996,**
- National Water Act No. 36 of 1998,**
- Relevant By-laws.**

2.9 ACCEPTANCE OF CONDITIONS OF THESE SPECIFICATIONS

- ***The contractor must provide a certified copy of his Public Liability insurance when signing this document.***

I, _____ the Contractor, do hereby declare that my company _____ acknowledge having read and understood the conditions contained in this legal document and furthermore we agree and accept to abide by the conditions and requirements of the act.

SIGNATUE CONTRACTOR: _____ DATE _____

SIGNATUE WITNESS _____ PRINT NAME: _____

AGENT ACTING ON BEHALF OF THE CLIENT:

NAME: _____ DATE _____

SIGNATUE: _____

SIGNATUE WITNESS _____ PRINT NAME: _____

2.10 INDEMNIFICATION

The Contractor hereby certifies that all contracting workmen recognize the inherent hazards that exist on the premises / property / site of _____
_____ (Client detail and site address) and that the Contractor;

- enters the property entirely at his/her own risk and therefore the Contractor waives any claim of whatsoever nature against _____, (Client) its employees, agents and/or mandatories in respect of any loss, damage and/or injury whether same is the result of any negligent act or omission on the part of _____(contractor), it's employees, agents and/or mandatories or other independent Contractors or by a third person or by way of defective equipment or materials supplied by the company, and further the Contractor;
- Hereby indemnifies _____(Client), its employees, agents and/or mandatories against any claims from the Contractor's employees and/or from any other person, arising and being caused in the manner set out above.

APPOINTMENT OF CONTACTOR CONSTRUCTION WORK

CONSTRUCTION REGULATION 5(1) (k)

AGENT BEHALF OF: _____ (Name of Client)

PROJECT/SITE: _____ (Name & Address or Area)

PROJECT PERIOD: from _____ to _____

AGREEMENT WITH MANDATARY IN TERMS OF SECTION 37(1) AND (2) OF OHS ACT 85 OF 1993

DEFINITION OF MANDATARY

- includes an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or a user.

DEFINITION OF AGENT

- means any person who acts as a representative for a client in the managing the overall construction work.

SECTION 37(1)

- (1) Whenever an employee does or omits to do any act which it would be an offence in terms of this Act for the employer of such employee or a user to do or omit to do, then, unless it is proved that-

- (a) in doing or omitting to do that act the employee was acting without the connivance or permission of the employer or any such user;
- (b) it was not under any condition or in any circumstance within the scope of the authority of the employee to do or omit to do an act, whether lawful or unlawful, of the character of the act or omission charged; and

all reasonable steps were taken by the employer or any such user to prevent any act or omission of the kind in question, the employer or any such user himself shall be presumed to have done or omitted to do that act, and shall be liable to be convicted and sentenced in respect hereof; and the fact that he issued instructions forbidding any act or omission of the kind in question shall not, in itself, be accepted as sufficient proof that he took all reasonable steps to prevent the act or omission.

SECTION 37(2)

The provisions of subsection (1) shall mutates mutandis apply in the case of a mandatary of any employer or user, except if the parties have agreed in writing to the arrangements and procedures between them to ensure compliance by the mandatary with the provisions of this Act.

ACCEPTANCE BY MANDATARY

In terms of the provisions of Section 37(2) of the Occupational Health and Safety Act 1993, and Construction Regulation 4(1) (c),

I, _____ (Appointed 16(2) person) acting for and on behalf of _____

_____ (Company / Close

Corporation/Enterprise/ Owner/User) undertake to ensure that the requirements and provisions of the Act and Regulations are complied with.

Print Name : _____ . (Agent, Principal Contractor or Contractor)

Signature: _____ at _____ .

Designation: _____ . Date: _____ .

Mandatar- COIDA / Federated Employers Mutual

No.: _____ .

Mandatar- Professional Indemnity Insurance no: _____ .

CLIENT

Print Name: _____ . (Appointed 16(1) person/Client/Agent of Client or Principal Contractor)

Signature: _____ at _____ .

Designation: _____ Date: _____ .