



Standard

**Distribution
Transmission
Generation**

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High Voltage
Systems**

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OPERATING REGULATIONS

for

HIGH-VOLTAGE SYSTEMS

(These regulations issued in September 2022 replace all previous regulations)

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GENERAL INSTRUCTIONS GOVERNING THE WORKING OF THE ELECTRIC POWER SYSTEMS OF ESKOM

*These **operating** regulations are the minimum requirements.*

Additional requirements must be applied where necessary.

1. These **operating** regulations shall apply to all **operating**, maintenance and construction on the **high-voltage apparatus** of Eskom. Their purpose is to ensure the safety of all persons and to safeguard both the **apparatus** and the continuity of supply.
2. Every employee issued with these regulations must make himself thoroughly acquainted with, and shall be held responsible for compliance with, the regulations contained herein.
3. A copy of this regulations shall be issued to all such employees and other persons as the responsible manager may decide upon and the procedure governing the issue, production upon request, and return of such books shall be in accordance with rules approved by the responsible manager.
4. Circulars or instructions deriving from the DECISION REGISTER, in addition to and in modification of those contained in this book, may be issued from time to time, and when any regulation is amended or cancelled by such circulars, this book must be corrected accordingly. These circulars and instructions shall be regarded as an extension of the regulations.
5. Employees who require information in connection with the power system must apply to their immediate superior through whom arrangements will be made by the head of the department to supply the information and, if necessary, give practical demonstrations.

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6. These regulations are an extension of and must be read in conjunction with the Occupational Health and Safety Act (Act 85 of 1993) as amended and the regulations made there under. Area Operating Regulation shall be subject to the requirement of the ORHVS.
7. Whereas not all the functions contemplated in these regulations may be individually required in the case of every portion of the area(s), the responsible manager may combine these functions to suit the organisation and shall delegate authority in writing to any employee concerned.
8. In cases where the Eskom power system is electrically interconnected with that of another supply authority, such instructions as are necessary for co-ordinating the operation of the two power systems thus interconnected, shall be issued as a special instruction under the joint authority of Eskom and the supply authority concerned.
9. In cases where, for practical reasons, these regulations cannot be complied with and where safety is not compromised, an exemption must be applied for in writing to the chairperson of the National ORHVS Care Group.
10. Any word in these regulations implying the masculine gender shall also indicate the feminine and vice versa.
11. These regulations will come into force in **October 2023 and shall remain in force until replaced by the new revision.**
12. These regulations together with the area operating regulations shall always be in the possession of the authorised person performing activities in line with ORHVS.

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SECTION 1 DEFINITIONS

Throughout these regulations, all references to terms defined in section 1 appear in bold face.

- 1.1. **Alive** or **live** means electrically connected to the power system or electrically charged.
- 1.2. **Alteration or repair** means work on any apparatus that will require to be commissioned. This shall exclude replacement / repairs of poles, structures and hardware up to and including 33 kV and preventative maintenance on HV and EHV structures.
- 1.3. **Apparatus** means any generator, transformer, motor, switchgear, isolator, feeder, convertor, rectifier, electrostatic precipitator, or any other high-voltage plant installed in a station.
- 1.4. **Appointed operator** means a person who is authorised to do **operating** and is deemed to be an authorised person in terms of these regulations.
- 1.5. **Approved** means sanctioned for use by SCOT (Steering Committee of Technology).
- 1.6. **Area operating regulations** means any document issued as an extension of the ORHVS of Eskom, but where application is restricted to the area concerned.
- 1.7. **Authorise** or **Authorised** refers to the giving of permission in writing to perform specific duties and responsibilities in terms of these regulations. Authorisation remains valid for a maximum period of up to five years which is based on divisional requirements.
- 1.8. **Authorised person** means a person, who has been authorised in terms of these regulations.
- 1.9. **Auxiliary apparatus** means the busbars and apparatus at a station, which are supplied by standby generators or the secondary sides of station, unit or earthing transformers or from the tertiary windings of main transformers.

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- 1.10. **Barrier** or **Barricading** or **Barricade** means a device designed and approved by Eskom to restrict approach to live high-voltage electrical apparatus.
- 1.11. **Breaker** or **Circuit Breaker** means a device designed to make or break electric current under both normal and fault conditions.
- 1.12. **Busbar** means a conductor or group of conductors that serve as a common connection for two or more electric circuits within a station.
- 1.13. **Cable** means a feeder and includes the terminations.
- 1.14. **Circuit** means the whole of the conductors and apparatus from and including the blades of all isolators or the contacts of other apparatus (e.g. disconnect circuit breaker) provided for completing the connection to the busbars.
- 1.15. **Control centre** means a place from where the safe operation of the generation, transmission and distribution of electric power to customers is controlled or directed.
- 1.16. **Control earth:** A control earth is either an earth switch or a portable earth that is applied and removed on instruction from the control officer.
- 1.17. **Control officer** or **Controller** means an authorised person on duty at a **control centre**, who is responsible for the general operation of the power system or a section thereof.
- 1.18. **Control panel** means the panel on which control switches and other equipment are mounted for controlling the operation of apparatus.
- 1.19. **Control switch** means the switch or device that controls the operation of a breaker, switch, isolator, or other apparatus.
- 1.20. **Danger/dangerous** means a condition/substance that constitutes a risk of personal injury, impairment of health, death, or property damage.
- 1.21. **Dead** means that any apparatus so described is at or about zero potential and disconnected or isolated from any live 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.

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- 1.22. Dead-ended feeder** means a feeder that gives supply to a circuit or circuits for which no alternative supply is available, and no feedback is possible from said circuit or circuits. A dead-ended feeder can give supply to several such circuits.
- 1.23. Declaration form for non-electrical activities on live lines** means a printed form containing declarations and clearance sections for the authorisation of all non-electrical activities to be done on live operational lines in terms of these regulations.
- 1.24. Designated Person** means a person or his delegate which is appointed under the Occupational Health and Safety Act (Act 85 of 1993) (General Machinery Regulation 2(1), 2.7(a)).
- 1.25. Disconnect Circuit Breaker (DCB)** is an apparatus that combines the functions of the breaker and the isolator into one device.
- 1.26. Distribution system** means all apparatus and feeders forming part of the power system, except that portion of the apparatus in a power station as defined.
- 1.27. Double circuit structure** means two circuits supported on the same structure but situated on opposite sides of the centre of the structure.
- 1.28. Earthing or earthed** means the connecting of apparatus electrically to the general mass of earth in such a manner that it will ensure an immediate safe discharge of electrical energy at all times.
- 1.29. Earthing gear or Earth** means the fixed or portable devices used for earthing electrical apparatus.
- 1.30. Earthing label** means a printed form or notice used for affixing to control panels, to indicate that apparatus has been earthed.
- 1.31. Earthing switch or earth switch** means a fixed mechanical device that is intended to connect phase conductors to earth for safety purposes.
- 1.32. Emergency switching** means:
- a) The opening only of such breakers or switches as may be necessary to avoid imminent danger to life or damage to apparatus.

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- b) The closing only of series capacitors bypass breakers to avoid imminent damage to apparatus.
- 1.33. **Employee** means a person employed by Eskom.
- 1.34. **Equipotential zone**: means a safe work area created to ensure that any two or more conducting parts that can be touched by a person simultaneously are bonded together by approved earthing leads to ensure a zone of equal potential between different parts of the working area.
- 1.35. **Feeder** means a line or cable in or from power stations or substations.
- 1.36. **Generator circuit** means the electrical portion of generating plant, its circuit shall include all the apparatus between its outgoing terminals and the busbar isolators and between its neutral terminals and earth.
- 1.37. **Ground or Floor level** means a permanent structure that is designed to walk on and can be elevated.
- 1.38. **Hazard(s)** - means a source of or exposure to danger.
- 1.39. **High voltage** means a nominal AC voltage greater than 1000 volts or DC voltage greater than 1500 volts.
- 1.40. **High-voltage authorisation form** means the printed form used for detailing in writing the extent of authorisation in terms of these regulations.
- 1.41. **Human Machine Interface (HMI)** means a software application that presents information to an operator or user about the state of a process, and to accept and implement the operators control instructions. An HMI is often a part of a SCADA (Supervisory Control and Data Acquisition) system.
- 1.42. **In commission** means the state of apparatus that is available for immediate use, although it may not actually be in service.
- 1.43. **Isolate or Isolated or Isolation or Isolating** refers to the disconnecting of the apparatus to form a visible air gap from all possible sources of electrical potential. In cases where a visible air gap

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cannot be created, equipment specific isolation procedures will apply. In the above context, isolation may be obtained by:

- a) the opening and removal of fuses/solids
- b) the opening of isolators
- c) the removal of jumpers/droppers
- d) the opening of switches
- e) the racking out of truck-type switchgear
- f) the immobilisation of breakers having visible contact separation, and not fitted with grading capacitors
- g) the manual locking of the opened and isolated DCB blocking device.
 - The DCB Circuit (NOT the breaker) shall then be deemed isolated the same as the isolator circuit being isolated.

The isolation point can never be a part of the hand over.

- 1.44. **Isolator** means a device provided for the purpose of isolating apparatus from the source of electrical potential.
- 1.45. **Key cabinet** means a locked or sealed cabinet provided for safe custody of keys. Each key shall be adequately labelled.
- 1.46. **Line** means an exposed overhead feeder and includes the supports and all terminal equipment up to but excluding the line isolator, transfer or bypass isolators, line earth switches and DCB's.
- 1.47. **Linking** means the opening or closing of isolators or electrical and mechanical blocking/unblocking of a DCB.
- 1.48. **Live chamber** means any chamber, enclosure or any situation in which inadvertent human contact with conductors or live parts of electrical apparatus working at high voltage is possible from ground/floor level excluding high voltage non-lethal fence installations.
- 1.49. **Live work or live working** means maintenance, repair, building and construction work carried out on live and operational apparatus using approved techniques and equipment as specified in the standard for live work.

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- 1.50. **Live work declaration form** means a printed form containing declarations and clearance sections for the authorisation of all live work to be done on live, operational apparatus in terms of these regulations.
- 1.51. **Live work warning notice** means a portable or other warning notice provided to indicate that live work is in progress on apparatus and to indicate any special operating condition in force on any panel or circuit whilst live work is in progress.
- 1.52. **Medium voltage networks** mean lines, cables, feeders and associated equipment at voltages from 1 000 V to 33 kV.
- 1.53. **Mix Technology Gas Insulated Switch Gear (MTGIS)** is switch gear with embedded components that may include breakers, isolators, earth switches, current transformers and voltage sensing devices.
- 1.54. **Non-electrical activities** mean activities using approved techniques and equipment as specified in the relevant standards, that involve the power line structure only and that do not require the making of intentional contact, either through insulated tools and / or bare hand techniques, with any live conductors.
- 1.55. **Operate** or **Operating** means switching, linking, safety testing and earthing.
- 1.56. **Operating diagram** (Paper/Mimic/SCADA/HMI) means the diagram in a control centre, or in a power station control room with the purpose of indicating the operating position and state of all apparatus.
- 1.57. **Operating instruction form** means a printed/electronic form used for recording instructions issued by the control officer relating to the operating to be carried out on electrical apparatus.
- 1.58. **Operating lock** means an approved lock forming part of a series of locks operable by common keys in the possession of authorised persons only.
- 1.59. **Operating stick** means the approved insulated rod provided to enable live isolators and fuses to be operated and to carry out safety testing and earthing.

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- 1.60. **Out of commission** means the state of any apparatus, which has been taken out of service and is not available for immediate use.
- 1.61. **Panel or bay** means all the apparatus in the same circuit situated in live chambers, prohibited or restricted areas, from and including the busbar isolators and/or connectors.
- 1.62. **Piggyback system** means a system where more than one circuit of different high voltages are supported on the same structure. This term excludes double circuit structures and high voltage structures carrying low-voltage conductors.
- 1.63. **Permission to Operate and Work** means permission granted by a control officer to an appointed operator authorising switching, linking, safety testing, earthing and handover over of apparatus in a designated section of the network in preparation for work.
- 1.64. **Permission to Sectionalise** means permission granted by a control officer to a maximum of three appointed operators authorising switching and linking on a designated section of the network to locate and isolate faulty plant from the rest of the network and restore supply to healthy sections of the network.
- 1.65. **Power station** means a site on which electrical energy is generated and shall also comprise all works necessary or incidental thereto, including buildings and all apparatus up to the point where energy is ready for distribution. It may or may not include any substation situated within the precincts of the power station, as determined.
- 1.66. **Power system** means the power stations, feeders, stations and apparatus whereby electrical energy is made available to the customers' points of supply.

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- 1.67. **Pre-work checklist** means a form used by the responsible person to check that he has considered or verified all requirements before starting actual physical work as well as hazards and risks as identified by the risk assessment which must be discussed with all the workers allocated to do work under a specific work permit.
- 1.68. **Prohibited area** means an enclosed area in which live conductors or live parts of electrical apparatus working at high voltage are accessible but situated in such a position that inadvertent human contact therewith is not possible from ground/floor level.
- 1.69. **Prohibitory sign** means an approved sign attached to a point of isolation and/or control panel indicating work in progress and prohibiting interference with the apparatus to which it is attached.
- 1.70. **Responsible person** means a person, who has been authorised to be responsible for ensuring that the work on the apparatus covered by a work permit can be, carried out with safety and within the terms of these regulations.
- 1.71. **Restricted area** means an enclosed area that is neither a live chamber nor a prohibited area as defined, and that is enclosed for the purpose of power system security and the safety of personnel.
- 1.72. **Risk assessment** means the process to determine as far as reasonably possible, what the dangers/hazards to the health and safety of persons attached to any activity or work and the precautions that are to be taken to mitigate the risks, dangers and hazards.
- 1.73. **Safety or Non-standard lock** means an approved lock for which only one unique key is available.
- 1.74. **Safety clearance or minimum approach distance** means the minimum distance that, for safety reasons, needs to be maintained between any part of a person's body or any work tool and any unearthed bare conductor.

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- 1.75. **Safety panel** means apparatus or line that has been isolated and earthed as a precautionary measure to prevent contact with the live high-voltage apparatus or line where there is a risk of encroaching in person or with machinery or objects on the safe working clearances when work is being performed near or close to such apparatus or line. The apparatus or line is therefore deemed to be safe only if it is isolated and earthed in accordance with the ORHVS.
- 1.76. **Safety testing** means the testing of apparatus to ascertain whether it is alive or dead by means of approved equipment provided for the purpose.
- 1.77. **Standards for live work** means written instructions for the safe execution of work on live apparatus, constituting an extension of these regulations, stating exactly how live work, referred to in these regulations, is to be done.
- 1.78. **Station** means a power station or a substation.
- 1.79. **Substation** means a site on which any transforming, switching or linking apparatus forming part of the power system is situated and on which no active power-generating equipment other than auxiliary generating sets is situated. The term 'substation' includes distribution stations and switching stations.
- 1.80. **Supervision** or **Supervise** refers to the overseeing of the actions of a person or persons so as to prevent any act that could be dangerous or in contravention of these regulations.
- 1.81. **Switch** means a device, other than a breaker, designed for making or breaking a rated flow of electric current. The term includes air break switches or weight-operated disconnects and similar devices.

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- 1.82. **Switching** means the opening and closing of breakers or switches.
- 1.83. **Tagging** means the warning notice that is placed on the operating diagrams at the Control Centre.
- 1.84. **Warning notice** or **sign** means an approved notice or sign calling attention to the danger of approach to, or interference with, the apparatus to which it is attached and to indicate any special operating condition.
- 1.85. **Work** or **Working** or **Worked** refers to all physical activities in connection with apparatus, excluding operating and any non-dangerous activities that will not affect the health and safety of workers or the safe operation of apparatus.
- 1.86. **Working earth** means a supplementary portable earthing device used on apparatus in such a position that it is visible from and applied as close as possible to the point of work in such a manner that an equipotential zone is created.
- 1.87. **Work permit** means a written declaration on the work permit form, signed by the appointed operator and issued to the responsible person.
- 1.88. **Work permit form** means a printed form containing the application, work permit and clearance for the authorisation of all work to be done on apparatus in terms of these regulations.
- 1.89. **Workers register** means a register of workers allocated to do work. An authorised person must complete the workers register.

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SECTION 2 CONTROL OF THE POWER SYSTEM

2.1 DUTIES AND RESPONSIBILITIES OF CONTROL OFFICERS

The **control officer** shall be responsible for carrying out the following duties in addition to duties detailed elsewhere in these regulations in so far as they apply:

- 2.1.1 Ensuring the safety of persons, safety of **apparatus** and the continuity of the power supply to customers.
- 2.1.2 Only **authorised control officers** shall issue instructions relating to **switching, linking, safety testing** and **earthing** activities to the extent of their **authorisation**, except where persons are being trained for their authority. These trainees shall **operate** and issue instructions under the **supervision** of a **control officer**, provided that the **appointed operator** has been duly informed of such an arrangement.
- 2.1.3 Issuing instructions for all **operating** in connection with the section of the **power system** under his control with the following exceptions:
 - 2.1.3.1 **Emergency switching**
 - 2.1.3.2 **Operating on dead-ended feeders and auxiliary apparatus in power stations** excluded by means of **area operating regulations**.
 - 2.1.3.3 **Working earths on lines and totally isolated substations** as per reg. 5.5.4 only.
- 2.1.4 **Operating** via supervisory control as the **power system** demands.

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- 2.1.5 Before issuing **operating** instructions to **appointed operators**, ensure that all parties have the updated corresponding diagrams in their possession.
- 2.1.6 Keeping a record of the time and details of all **operating** carried out by him or under his instructions, including the names of persons instructed to carry out such **operating**.
- 2.1.7 Keeping a record of the time and details of **emergency switching**, including the names of persons who have carried out these operations.
- 2.1.8 The manipulation of the **operating diagram/SCADA/mimic** in the **control centre** to indicate, at all times, the state of **breakers, switches** and **isolators** and position of **earths** throughout the section of the **power system** under his control and recording the names of persons to whom **feeders** or **apparatus** are handed out.
- 2.1.9 Giving the relieving **control officer** all the relevant information regarding the state of the **power system** and all other necessary information for the proper execution of his duties. It shall also be the duty of the **control officer** taking over to obtain this information and to read and endorse the relevant entries in the records.

2.2 KEEPING OF RECORDS

2.2.1 OPERATING AUTHORISATIONS

2.2.1.1 A record shall be maintained in each **control centre**, except for National Control, for the section of the **power system** under its jurisdiction, of the names and telephone numbers of all persons **authorised to operate** in terms of these regulations and the extent of their **authorisation**.

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2.2.2 LOG.

2.2.2.1 A record shall be kept at **power stations** and **substations**, in which the **authorised** person shall record a summary of activities, stating the date and times and shall print his name and add his signature thereto.

2.3 ISSUE AND RECEIPT OF OPERATING INSTRUCTIONS

2.3.1 ISSUE AND RECEIPT OF OPERATING INSTRUCTIONS BETWEEN CONTROL CENTRES

2.3.1.1 Before any instructions are issued, the **control officers** shall discuss in detail the scope of **work** and **operating** to be carried out, including potentially hazardous conditions which may exist. All parties shall refer to the updated corresponding diagrams and shall agree to the relevant **operating**.

2.3.1.2 All instructions from the **control officer** relating to the operation of **apparatus** shall be given in detail, without abbreviations, stating the name of the **apparatus**, the nature of the **operating** and the time of confirmation of the instruction.

2.3.1.3 Following the issuing of the instructions by the **control officer**, such instructions shall be read back to the **control officer**, who shall confirm or, if necessary, correct the instructions.

2.3.2 CIRCUMSTANCES IN WHICH AN OPERATING INSTRUCTION BETWEEN CONTROL CENTRES SHALL BE CANCELLED

2.3.2.1 Should any circumstances arise to prevent or delay the carrying out of an **operating instruction** such instruction shall be cancelled and the **operating** deferred until it can be completed without interruption. In such circumstances a new **operating instruction** shall be issued.

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2.3.3 USE OF OPERATING INSTRUCTION FORMS

2.3.3.1 All instructions from the **control officer** relating to the operation of **apparatus** shall be given in detail, without abbreviations, stating the name of the **apparatus**, the nature of the **operating** and the time of confirmation of the instruction. These instructions may be pre-written by the **appointed operator** doing the **operating** or person **authorised** to transmit **operating** instructions on the **operating instruction form** provided for that purpose.

The **operating instructions** shall be written and carried out sequentially. If the instructions have been incorrectly pre-written, they are to be cancelled and are to be completely re-written at the instruction of the **control officer**. Should the instructions not be pre-written, they are to be written down on the **operating instruction form** as issued by the **control officer**.

Following the issuing of the instructions by the **control officer**, such instructions shall be read back to the **control officer**, who shall confirm or, if necessary, correct the instructions. The receiver of the instruction, thereafter, shall sign the **operating instruction form**. Each separate step in the **operating instruction** shall commence on a new line on the **operating instruction form**.

Standard abbreviations as detailed in the annexure to these regulations may be used when writing the instruction. In the case of a person in training, the form shall be countersigned by the **appointed operator** responsible for the **operating**.

2.3.3.2 The **operating instruction form** shall be taken to the place where the **operating** is to be carried out and the instructions shall be read by the **appointed operator** carrying out the **operating**, who shall check that the **apparatus** and the intended **operating** corresponds with the written instruction before the operating detailed on it is commenced.

The **appointed operator** who received the instructions from the **control officer** shall carry out each instruction on the **operating instruction form** in its entirety. When a person in training is being trained for **operating**, both

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the **appointed operator** and the person in training shall satisfy themselves that the **apparatus** and intended **operating** corresponds with the written instruction before the **operating** is commenced.

2.3.3.3 Each item as detailed on the **operating instruction form** shall be ticked off as each step of **operating** is completed.

2.3.3.4 The completion and time of completion of **operating instructions** shall, as soon as possible, be reported to the **control officer**.

2.3.3.5 The **operating instruction form** relating to completed **operating** shall be retained for a minimum period of three months.

2.3.4 USE OF OPERATING INSTRUCTION FORM FOR TRANSMITTED OPERATING INSTRUCTION

2.3.4.1 In cases where the absence of direct communication between a person who is **operating** and the **control officer** makes it necessary for **operating instructions** to be transmitted through a third person, such third person in addition to the person **operating**, shall comply with regulations **2.3.3.1** and **2.3.3.4**.

2.3.5 ISSUE AND RECEIPT OF INSTRUCTIONS AND USE OF OPERATING INSTRUCTION FORM FOR PRE-AUTHORISED OPERATING

2.3.5.1 When **operating** has to be done on the **distribution system** and where there is no communication with the **control centre** and the transmitting of **operating instructions** by a third person is not practicable, pre-authorized **operating instructions** may be given.

2.3.5.2 Pre-authorized **operating instructions** may be given to **power station** staff when it is necessary to synchronise, load, change-over auxiliary supplies, off-load and shut down one or more generators.

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The **appointed operator** to whom pre-authorised **operating instructions** are issued shall comply with regulation **2.3.3**.

If any change in the running arrangement of a **power station** should occur for any reason after the issuing of the pre-authorised **operating instructions**, the pre- authorised **operating instructions** must be cancelled.

2.3.5.3 A permission to operate and work instruction may be issued to an **appointed operator** and **operating** shall be performed in accordance with Regulation **5.3**.

2.3.5.4 A permission to sectionalise may be granted to an **appointed operator** and shall be performed in accordance with Regulation **5.10**.

2.3.5.5 The **operating** steps planned by the **appointed operator** having received a **PTO&W** or **PTS** shall be detailed on an **operating Instruction form** and the **operating** performed in accordance with Regulation **2.3.5**.

2.3.6 CIRCUMSTANCES IN WHICH AN OPERATING INSTRUCTION SHALL BE CANCELLED BY AN APPOINTED OPERATOR

2.3.6.1 Should any circumstances arise to prevent or delay the carrying out of an **operating instruction** by the **appointed operator**, such instruction shall be cancelled and the **operating** deferred until it can be completed without interruption. In such circumstances a new **operating instruction** shall be issued.

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2.4 CONTROL OF LOADING OF POWER STATIONS UNDER NORMAL AND ABNORMAL CONDITIONS

The official in charge of loading at a **power station** and the responsible **control officer** shall effectively exchange all the relevant information pertaining to the loading of plant and continuity of supply. The **control officer** shall keep this official fully informed as to the expected loading of plant and the capacity to be kept in reserve. The official shall inform the **control officer** from time to time on the condition of the plant and any change that might affect previous arrangements.

In the event of conditions arising at a **power station**, which may affect the health of generating plant, the official in charge of that plant shall take the necessary action to safeguard the plant and shall immediately notify the **control officer** of its condition and possible impact on previous arrangements.

For **work** on generating plant at a **power station**, the official in charge shall make the necessary arrangements with the **control officer** for the plant to be taken **out of commission**. On completion of the **work**, this official shall notify the **control officer** that the plant is available for service. Should any delay arise in returning the plant at a pre-arranged time, this official shall immediately advise the **control officer** of the delay so that other arrangements may be made.

Plant shall be considered to be **out of commission** immediately after the **control officer** has given permission for **work** to be started thereon, and plant shall be considered to be **in commission** as soon as the **control officer** has been advised that such plant is available for service.

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Should abnormal conditions arise requiring deviation from any pre-arranged programme, all concerned will co-operate in adjusting to the altered conditions in the most efficient and expeditious manner. Should any question arise as to the measures to be taken, the matter will be referred to the senior officials of the departments concerned.

Pre-authorized synchronising of generators with the system shall not be permitted at system frequencies above 50, 3 Hz.

Pre-authorized disconnection of generators from the system shall not be permitted at system frequencies below 49, 7 Hz.

2.5 CONTROL OF LOADING OF DISTRIBUTION APPARATUS

Subject to the provisions laid down in regulation 2.1, the official in charge shall be responsible for the **apparatus** on load. Whenever **apparatus** has to be taken **out of commission** at a **substation**, due to failure or for **work** to be carried out thereon, this official shall make arrangements with the **control officer** and the customers where necessary, to prevent overloading of **apparatus** remaining in service.

In an emergency the **control officer** shall take the necessary action and notify the official in charge of all actions taken.

2.6 ORDER OF PRECEDENCE IN USE OF COMMUNICATION SYSTEMS

Messages from and to the **control officer** shall at all times take precedence over all other calls or messages.

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2.7 MAKING APPARATUS ALIVE ON FIRST INSTALLATION, OR AFTER ALTERATION OR REPAIRS

- 2.7.1** Any **apparatus** on first installation, after **alterations or repairs** shall not be placed **in commission** without prior handing over for service to the **control officer** by the **designated person** of the department concerned.

No commissioning shall be carried out unless all **apparatus** and control panels are suitably labelled.

The **control officer** shall ensure that all necessary **high-voltage** testing of **apparatus** and the checking of all phasing, synchronising equipment and protection equipment is carried out on first installation or after **alterations or repairs**.

A note to this effect, including the names and designations of persons responsible for such tests, shall be logged by the **control centre** concerned.

The **control officer** shall be responsible for arranging, where necessary, for temporary settings of relays on first installation of **apparatus**, and thereafter for the final settings of the relays for normal working conditions.

- 2.7.2** **Apparatus** that is being installed does not fall under the responsibility of the **control officer** until the installation reaches the stage at which the making of connections between the **apparatus** and the **power system** will enable some part of the **apparatus** to be made alive.

The **control officer** shall then immediately be advised of the status by the **appointed operator** who shall give the **control officer** all required details of the **apparatus**, including the number and position of any **earths** which are at that time affixed to the **apparatus**.

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From this stage, the **control officer** shall be responsible for all **earths** on the **apparatus** being commissioned, and the procedure detailed in section 5 shall be followed.

2.8 TAKING PLANT OFF THE SYSTEM

Apparatus shall not be considered to be part of the **power system** when it has been disconnected and declared **out of commission** by the **designated person** from the **power system** by:

- a) the removal of droppers / jumpers on voltages 44 kV and above.
- b) the breakaway of the first span from the point of isolation on voltages 33kV and below.
- c) the opening of **isolators**. When opened, these **isolators** shall be locked with **safety locks** and the keys placed in the custody of a person not directly involved with the **operating**. In generation it shall be kept in a key safe: or,
- d) the locking of the DCB's mechanical blocking device that shall be locked with **safety locks** and the keys placed in the custody of a person not directly involved with the **operating**.

The **designated person** shall ensure that **apparatus** declared not part of the **power system** is prepared in accordance with these regulations with exception that **operating instructions** shall not be issued by the **control officer**.

2.9 USE OF OPERATING DIAGRAM

The **operating diagrams** at the **control centres** and **power stations** shall be adjusted as may be necessary on completion of any **operating**. Such **operating** shall not be deemed to be completed until the **operating diagram** concerned has been adjusted to indicate the correct state of the **apparatus** affected.

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2.10 PERSONS SUMMONED TO A SUBSTATION

When an **authorised person** is summoned to a **substation**, he must immediately contact the relevant **control centre** to report his arrival.

SECTION 3 ACCESS

3.1 ACCESS TO LIVE CHAMBERS, RESTRICTED OR PROHIBITED AREAS

3.1.1 LOCKING OF DOORS AND GATES

Every door and gate giving access to a **live chamber, restricted or prohibited area** shall normally be closed and locked. To facilitate an emergency exit, a door or gate giving access to a **live chamber, restricted or prohibited area** shall remain unlocked while **work or operating** is in progress provided no unauthorised person may gain unrestricted access.

3.1.2 PERSONS AUTHORISED TO ENTER LIVE CHAMBERS, RESTRICTED OR PROHIBITED AREAS

Only **authorised persons** may enter **live chambers, restricted or prohibited areas** without having to obtain special permission except as provided for in regulations 3.2, 3.3 and 3.4.

3.2 PROCEDURE FOR ACCESS OF PERSONS TO LIVE CHAMBERS

Only **authorised persons** or persons under **supervision** of an **authorised person** may enter a **live chamber**.

In Generation no individual is authorised to enter **live chambers**.

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3.3 PROCEDURE FOR ACCESS OF PERSONS TO PROHIBITED AREAS

A person may enter a **prohibited area** only if he is:

- a) an **authorised person** or
- b) under the **supervision** of an **authorised person** or
- c) **working** under a **work permit**.

An unauthorised person shall remain on **ground level** unless the working area is suitably demarcated by means of **barriers** to ensure that inadvertent human contact with **live apparatus** adjacent to or above the demarcated area is not possible from within the **barriers**. In addition, a **work permit** shall be issued detailing the **apparatus** on which he is required to **work**, unless he is **working** on the **distribution system** under the **supervision** of an **appointed operator** authorised for **supervision** in accordance with regulation 8.2.7.

If a section of a **prohibited area** and the access to that section in which work is to be carried out is effectively segregated so as to prevent **dangerous** approach to **live apparatus**, such section shall no longer constitute a **prohibited area** and no **supervision** by an **authorised** person shall be required.

3.4 PROCEDURE FOR ACCESS OF PERSONS TO RESTRICTED AREA

Access to **restricted areas** shall be allowed only to persons who have obtained permission, through an authorised method.

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SECTION 4 KEYS

4.1 ISSUE AND USE OF KEYS FOR LIVE CHAMBERS, PROHIBITED OR RESTRICTED AREAS AT POWER STATIONS

4.1.1 KEYS TO BE KEPT IN A KEY CABINET

Keys to **live chambers prohibited** or **restricted areas** and to **apparatus** must be kept under lock and key in the **key cabinet** provided for that purpose. The key to this **key cabinet** must be kept in the custody of the person on duty responsible for the issue and return of keys to **live chambers, prohibited or restricted areas**.

4.1.2 PERSONS TO WHOM KEYS MAY BE ISSUED

Keys to **live chambers, prohibited** or **restricted areas** may be issued only to a person authorised in terms of regulation 3.1.2 who will be held solely responsible for these keys while they are in his possession. He must not let any of these keys pass out of his possession until they are returned to the person responsible for the safe custody of the keys. Refer to regulation 5.2.1.

4.1.3 ISSUE OF KEYS TO BE RECORDED

When a key to a **live chamber, prohibited** or **restricted area** is issued to a person in terms of regulation 4.1.2, the particulars of the key, the identity of the person to whom the key is being issued and the time and date of issue must be recorded. In all cases the signature of the person receiving the key and that of the person issuing the key must be entered against the record. Similarly, when a key to a **live chamber, prohibited** or **restricted area** is returned, its receipt shall be recorded.

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4.1.4 RESPONSIBILITY OF PERSONS AUTHORISED TO USE KEYS

Subject to the provisions of regulation 5.7, a person who has unlocked a door or gate giving access to a **live chamber, prohibited or restricted area** shall, during the period when the door or gate is unlocked, be responsible for enforcing compliance with regulations 3.2, 3.3 and 3.4.

On withdrawing from a **live chamber, prohibited or restricted area** for any reason, the person to whom a key to a **live chamber, prohibited or restricted area** has been issued shall be responsible for seeing that all persons have withdrawn from the **live chamber, prohibited or restricted area** and that the doors or gates are securely locked before returning the key to the person responsible for the custody of the key. Under no circumstances may the key to a **live chamber, prohibited or restricted area** be left in the lock or be kept for longer than is necessary by the person to whom it has been issued.

4.1.5 MARKING OF KEYS AND LOCKS

At **power stations**, each door or gate giving access to a **live chamber, prohibited or restricted area** shall be marked with the name of the **live chamber, prohibited or restricted area** and, where necessary, with a distinguishing number close to the lock. A label marked with the name of the **live chamber, prohibited or restricted area** and the distinguishing number corresponding to the lock shall be attached to the key by means of a suitable key ring.

4.1.6 PERSONS AUTHORISED TO USE POWER STATION MASTER KEYS

Only **authorised persons** shall use master keys for access to **prohibited or restricted areas at power stations**.

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4.1.7 REQUIREMENTS OF A KEY SAFE SYSTEM AT POWER STATIONS

4.1.7.1 A key safe shall conform to the general requirements as shown in 0. Each key safe at a site shall be clearly marked with a unique identifying number.

4.1.7.2 An operating lock series shall be different from any other series in use at that site. If the operating locks are not clearly discernible from other series in use at that site, they shall be provided with a permanent common identifying feature.

4.1.7.3 A **safety lock** shall:

- a) be marked with an individual number.
- b) have only one available key permanently marked with the same number.
- c) form part of a series different from any other series in use at that site. The available key shall be affixed to a key ring in such a manner as to preclude its removal without the use of tools. Furthermore, the dimensions of the ring shall be such that destruction of the ring is necessary before it can be removed from a locked **key safe**. No master keys must be available for **safety locks**. If the key is lost, the relevant head of department will be in charge of the removal of the **safety lock**. The incident must be recorded in the **appointed operators'** logbook and the head of shift's logbook.

4.1.8 USE OF A KEY SAFE SYSTEM AT POWER STATIONS

No person may at any time forcibly open, damage or interfere with a **key safe**, its locks or the keys retained thereon.

No **operating lock** may be removed from a **key safe** whilst any **safety lock** is still applied on that specific **key safe**, except under the following conditions.

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- a) If it becomes necessary to gain access to the keys on the **key safe** for any reason other than for testing in terms of regulation 5.9, permission must be obtained from the relevant head of department, who must personally witness the procedure. The occurrence must be recorded in the appropriate **authorised persons** logbook or
- b) if the **key safe** must be extended as per regulation 4.1.8.4.

4.1.8.1 Before a **work permit** is issued, all points of isolation shall be immobilised by the application of a **safety lock** in such a manner that inadvertent operation of the point of isolation is impossible.

4.1.8.2 The integrity of isolation is ensured by the application of **safety locks** and **prohibitory signs** at each point of isolation. These locks shall be applied by the **appointed operator**.

4.1.8.3 The keys for the **safety locks** used for isolation as required before issue of a **work permit** shall be placed together on one **key safe**. The key safe shall be locked by the **appointed operator** with an operating lock and a **safety lock**. The key to this **safety lock** shall be handed to the **responsible person** together with the **work permit**.

4.1.8.4 Where it is necessary to use some, or all the original isolation points, in addition to other isolation points, for another **work permit**, an additional **safety lock** must be applied to the original key safe. The key for this lock, together, with the safety lock keys for the additional isolating points, must be placed on another key safe and locked with an additional operating lock and safety lock. Cross-referencing of these **work permits** is required.

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4.2 ISSUE AND USE OF KEYS IN THE DISTRIBUTION SYSTEM FOR LIVE CHAMBERS, PROHIBITED OR RESTRICTED AREA

4.2.1 KEYS TO BE KEPT IN A CABINET

Where keys to **live chambers, prohibited areas** or **restricted areas** are kept at a **substation**, they shall be kept in a locked or sealed cabinet. Each key shall be adequately labelled.

4.2.2 EMERGENCY ACCESS TO KEY CABINETS AT SUBSTATIONS

Any person may open the **key cabinet** in an emergency, where human life is endangered or in abnormal circumstances to obtain keys to gain access to **live chambers, prohibited areas** or **restricted areas**. The person shall, as soon as possible, advise the official in charge or the **control officer** on duty.

In the event of a person breaking into the **key cabinet** or finding it broken, shall take possession of all keys contained in the cabinet and return them, as soon as possible, to the official responsible for their custody. The official shall return the keys to their normal position and replace the lock or seal of the **key cabinet**.

4.2.3 RESPONSIBILITY OF PERSONS AUTHORISED TO USE KEYS

Subject to the provisions of regulation 5.7, a person who has unlocked the door or gate to a **live chamber, prohibited or restricted area** shall, during the period when the door or gate is unlocked, be responsible for enforcing compliance with regulations 3.2, 3.3 and 3.4. Immediately on entering a **live chamber, prohibited or restricted area** he shall lock the door or gate through which he has entered, except as provided for in regulation 3.1.1. On withdrawing from a **live chamber, prohibited or restricted area** for any reason, the person to whom the key has been issued, shall be responsible for seeing that all persons have been withdrawn and that the doors or gates are securely

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closed and locked. Under no circumstances may the key to the **live chamber, prohibited or restricted area** be left in the lock.

4.2.4 RIGHT TO POSSESS KEYS

Keys shall be issued only to **authorised persons**. All persons who have been issued with keys shall be responsible for the safe custody thereof and shall not transfer them to any other person.

4.3 SURRENDER OR LOSS OF KEYS

Any person to whom keys have been issued in terms of these regulations shall surrender such keys to Eskom on request. Loss of keys shall be immediately reported to the relevant head of the department.

4.4 USE OF LOCKS AND KEYS

4.4.1 USE OF LOCKS AND KEYS FOR ISOLATORS

Where **isolators** have manually operated mechanisms, these **operating** mechanisms shall be fitted with locking facilities and locks. These mechanisms shall be locked irrespective of whether the contacts are in the open or in the closed position. This excludes **isolators** that are operated by means of an **operating stick**.

4.4.2 USE OF LOCKS AND KEYS FOR TRUCK-TYPE SWITCHGEAR

Truck-type switchgear shall be locked irrespective of whether in the racked-in or racked-out position. For **isolation** purposes, truck-type switchgear shall be racked out and locked in that position or, if withdrawn, the shutters or other **barrier** devices shall be in place and locked.

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4.5 USE OF KEYS WHEN CHANGING OVER BUSBARS

In order to facilitate the changing over of **busbars** in **substations** with manually operated **isolators**, the **isolators** may be unlocked in advance. On completion of the entire operation, the **isolators** shall be locked again, except under emergency conditions when the locking of the **isolators** may be deferred until normal conditions are restored.

4.6 LOCKING OF SUBSTATIONS

Substations shall be kept closed and locked when unattended.

SECTION 5 SAFE OPERATING AND WORK PRACTICES

5.1 PERSONS AUTHORISED TO PERFORM SWITCHING, LINKING, SAFETY TESTING AND EARTHING OPERATIONS

Only **appointed operators** shall carry out **switching, linking, safety testing** and **earthing** activities to the extent of their **authorisation**, except where persons are being trained for **operating** authority. These trainees shall **operate** under the **supervision** of an **appointed operator**, provided that the **control officer** has been duly informed of such an arrangement.

The **switching** of **power stations'** auxiliary motor circuits by remote control shall be excluded from this regulation.

5.2 PROCEDURE FOR WORK IN LIVE CHAMBERS

5.2.1 On the Generation System

No person shall enter or be allowed to perform any activity or **work** in a **live chamber**, unless the **live apparatus** in the chamber has been

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effectively barricaded off or **isolated** and **earthed**. In addition, he shall **work** in accordance with regulation 8.1.

5.2.2 On the Distribution system

No person shall perform any **work** in a **live chamber or prohibited area**, unless the **apparatus** to be **worked** on is **isolated, earthed** and the rest of the **live apparatus** is **barricaded**. **Work** shall be performed in accordance with regulation 8.2.

5.3 MAKING APPARATUS OR LINES SAFE TO WORK ON

5.3.1 REQUIREMENTS FOR SAFE OPERATING

Note: No persons shall carry out **work** on any **apparatus** or **lines** unless the **apparatus** or **lines** have been prepared in accordance with these regulations or **area operating regulations**.

All **operating** on **apparatus** or **lines** on the **power system** shall be carried out under instruction from the **control officer** at the appropriate **control centre**, including **Permission to Operate and Work**. **Permission to Operate and Work** shall be performed in accordance with regulations 5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6.1, 5.3.6.3 and 5.4. The only exceptions shall be those mentioned in regulations 2.1.3 and 5.5.2.

Before any instructions are issued, the **appointed operator** or operators shall discuss in detail with the **control officer**, all **work** to be carried out, including potentially hazardous conditions which may exist. All parties shall refer to the updated corresponding diagrams and shall agree to the relevant **operating**.

5.3.2 Isolation from supply

Where it is necessary to **operate** at two or more points situated some distance apart, the **operating** may be performed by a corresponding

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number of **appointed operators**, but all the **operating** detailed under these regulations must be performed by one **appointed operator** only for each site. The **control officer** shall not give an instruction for any **earthing** operation to be carried out until **isolation** has been completed at all points. The **control officer** shall inform the **appointed operator** that the **breakers** and **isolators** at each point controlling the **feeder** have been opened.

Where continuous **operating** is in progress, the **appointed operator** may hand over to another **appointed operator** relieving him, provided that all **operating** instructions issued by the **control officer** to the off-going **appointed operator** have been fully carried out.

Where it is impracticable for one or more **appointed operator/s** to communicate directly with the **control officer**, instructions may be relayed through a person **authorised** to transmit **operating** instructions. These **appointed operators** must comply with the procedure set out in regulation 2.3.

Where a **breaker** or **isolators** can be controlled from a remote point over which the **appointed operator** has no control, such facilities shall be made inoperative before **isolation** is commenced.

5.3.3 SAFETY-TESTING OF APPARATUS AFTER ISOLATION FROM SUPPLY

Immediately before applying an **earth** at a point, the **appointed operator** shall ensure, by using an approved testing device provided for the purpose that such **apparatus** is **dead** at each point where an **earth** is to be applied.

In the case of certain **apparatus** that cannot be **safety tested** before **earthing**, the **earth** shall be applied in a manner approved by the applicable procedures.

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Where **cables** have been **isolated** and **earthed** and **work** on either of the end terminals is necessary, without these end terminals yet having been tested, the terminal boxes will be opened employing **approved work** procedures and the terminals tested with an **approved** testing device. Covered terminals shall be tested before any attempt is made to intrude on the covering.

Where a **cable** must be cut, and cannot be positively identified, the **cable** shall be spiked by means of an **approved** spiking device before the cable is cut.

5.3.4 PROHIBITORY SIGNS AND EARTHING LABELS

5.3.4.1 Exhibition of prohibitory signs

Before **apparatus** is **isolated** a **prohibitory sign** shall be affixed on each control panel corresponding with such **apparatus**. No isolation of **apparatus** shall be deemed complete until a **prohibitory sign** has been affixed at each point from which such **apparatus** can inadvertently be made alive.

The **prohibitory signs** must not be detached until all **earths** have been removed and the **apparatus** is ready to be made alive.

Prohibitory signs on the **control panel** shall be the last to be removed.

5.3.4.2 Exhibition of earthing labels at power stations

As soon as the completion of the earthing operation has been reported to the **control officer**, an earthing label shall be completed by the **appointed operator** stating the number and position of all **earths** and the work permit

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number, if one has been issued. The original form shall be detached and affixed to the **control panel** of the **apparatus** so

earthed. This shall apply when any **apparatus** at a power station is earthed in preparation for **work** on it, or any **feeder** panel is **earthed** for **work** external to the station by the Distribution Section.

At **power stations** where electronic mimic panels are in use, the electronic **earthing label** must be visible at the point where the **earth** is applied to the mimic panel; an **earthing label** or the electronic **earthing label** must be printed, signed and attached to the copy of the **work permit**.

5.3.4.3 Control of portable earths within generation

All applied **portable earths** at **power stations** shall be reflected on the **work permit** as a **control earth**. (see regulation 5.3.5.3.1).

The **appointed operator** shall remove an **earthing label** after the operation of removing the **earthing gear** to which it relates is completed at the instruction of the **control officer**.

5.3.5 EARTHING

Note: All **earths** applied or removed in a **substation** will be applied or removed at the instruction of the **control officer**, except when **earths** are applied as per regulation 5.5.4.

5.3.5.1 Minimum requirements

When **apparatus** other than a **line** or a **busbar** has been isolated from all points of supply and tested in accordance with these regulations such **apparatus** shall be **earthed** at all such points of supply.

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After **apparatus** has been **earthed** the **appointed operator** shall ensure that the **apparatus** is free from induction at the point of **work** to enable the **work** to be carried out in an **equipotential zone**.

When a **line** or section of a **line** has been **isolated** from all points of supply and tested in accordance with these regulations, at least one **control earth** shall be applied to the **line** or section of **line**, between the point of isolation and the first place of **work** excluding Single Wire Earth Return **lines**. The **appointed operator** shall then apply sufficient **working earths** on the **line** to enable the **work** to be carried out in an **equipotential zone**.

The **control earth** on an isolated Single Wire Earth Return **line** or a section of the **line** must be applied across the terminals and the earth point of the isolation transformer or a load transformer as close as possible to the worksite, even if it is beyond the point of **work**.

The overhead guard conductor of a **line** shall also be **earthed**.

When a static VAR compensator or capacitor bank has been **isolated** from all points of supply and tested in accordance with these regulations, it shall be **earthed** at all such points of supply.

Earths shall be applied in accordance with equipment specific earthing procedure to ensure that all possible trapped charges will be discharged for the duration of the **work**.

When a **busbar** has been **isolated** from all points of supply and tested in accordance with these regulations it shall be **earthed** at one point at least.

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When a transformer has been **isolated** from all points of supply and tested in accordance with these regulations each primary, secondary and tertiary winding of the transformer shall be **earthed** at its point of supply.

When a transformer winding cannot be **earthed** at its point of supply, or at any other part of the circuit between the winding and its point of supply, **work** on this circuit is permitted, provided that it has been **isolated** in accordance with these regulations, and that the other windings have been **earthed** at their points of supply. An auxiliary or tertiary low voltage supply from a transformer must be **isolated** at all points of supply and the **breakers** and **isolators** locked in the open position.

Totally enclosed metal clad switchgear shall be **earthed** only by means of the approved earthing gear provided as part of the switchgear.

5.3.5.2 ADDITIONAL REQUIREMENTS

Persons in charge of **work** may also, at their discretion, arrange for additional **earths** that are to be affixed to the **apparatus**.

5.3.5.3 APPLICATION

When **portable earthing gear** is being used, it must first be connected to an earthed metal structure, or to an approved electrode driven into the ground. The **earthing gear** shall then be connected to the **apparatus** to be **earthed** by means of an **operating stick**.

Where this is not possible due to space limitations (e.g. indoor substations) application of **earths** shall be covered by **area operating regulations**.

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5.3.5.3.1 EARTHING SWITCHES

When **apparatus** equipped with **earthing switches** needs to be **earthed** at more than one place, the **earthing switches** shall always be closed first, and thereafter any necessary **earthing gear** may be affixed to the **apparatus**.

Whenever **earth switches** on open conductor systems are closed, a **portable earth** shall be applied in parallel to provide additional protection. This **portable earth** shall be applied and removed at the instruction of the **control officer**.

This excludes non-ganged **earthing switches** in indoor substations and **medium voltage networks**.

Should an **earth switch** on open conductor systems be suspect, a full rated **portable earth** is to be applied in parallel.

In the process of removing the **earths** in preparation for making the **apparatus** alive, all **earthing gear** shall first be removed, and **earthing switches** shall be opened last.

5.3.5.3.2 SELECTIVE EARTHING

When it is necessary to work on less than all the phases of a **line** with a nominal voltage of 44 kV or higher, **working earths** may be selectively applied to the phase or phases that are to be **worked** on, provided safe working clearances to the other phases can be maintained at all times.

No person shall **work** on a **line** whose phases are selectively **earthed** unless supervised by an **appointed operator** who knows which phases do not have **working earths** applied, and who will ensure that safe working clearances to the unearthed phases are maintained at all times.

The conductors that do not have **working earths** applied must be treated as **alive** at working voltage.

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During **work** on vertical or delta configurations, any phase or phases below the phase being **worked** on shall be **earthed** by means of **working earths**.

5.3.6 WORKING ON LINES OR APPARATUS

5.3.6.1 HANDING OVER A LINE, SECTION OF LINE OR APPARATUS FOR WORK

When a **line**, section of **line** or **apparatus** has been prepared for **work** in accordance with these regulations, the **line**, section of **line** or **apparatus** shall be handed over to the **appointed operator** by the **control officer**. The **control officer** shall allow the application of **working earths** and on completion of the **work** the removal of all such **earths**. Immediately after a **line**, section of **line** or **apparatus** has been handed over to an **appointed operator** the **control officer** shall record the name of the **appointed operator** to the **line**, section of **line** or **apparatus** on the **operating** diagram.

5.3.6.2 WORKING ON A LINE OR SECTION OF LINE AT MORE THAN ONE PLACE

When a **line**, section of **line** or **apparatus** has been prepared for **work** in accordance with these regulations, the **line**, section of **line** or **apparatus** shall be handed over to the **appointed operator** by the **control officer**. The **control officer** shall allow the application of **working earths** and on completion of the **work** the removal of all such **earths**. Immediately after a **line**, section of **line** or **apparatus** has been handed over to an **appointed operator** the **control officer** shall record the name of the **appointed operator** to the **line**, section of **line** or **apparatus** on the **operating** diagram.

NOTE: The isolation point (isolators and DCB's) can never be a part of the hand over.

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For **work** on a **line** at several places remote from one another, provided the **line** has been prepared as detailed in these regulations, the **line** or section of **line** may be handed over to more than one **appointed operator**. The **control officer** shall record on the **operating** diagram the names of each person to whom the **line** or section of **line** has been handed.

5.3.6.3 CLOSE PROXIMITY TO LIVE CONDUCTORS OR APPARATUS

If **work** is of such a nature that a person, machine or object could inadvertently encroach on the minimum safe working clearance according to regulation **5.3.6.4**, then this is interpreted as close proximity.

The following precautions shall be taken prior to the commencement of **work** that could inadvertently encroach on the minimum safe working clearance to a live **line** or **apparatus** according to regulation 5.3.6.4.

- a) The auto-reclose features on all **breakers** controlling the supply to the live **line** shall be made inoperative.
- b) The relevant **prohibitory signs** shall be displayed on the control panels. Where the auto-reclose function of a **line** is made inoperative via supervisory, it will not be necessary to apply a **prohibitory sign** to the control panel. If the auto-reclose is rendered inoperative manually, the **prohibitory sign** shall be applied. Tags shall be displayed on all **Supervisory Control and Data Acquisition** systems irrespective of the method used to render the auto-reclose inoperative.
- c) The live **line** or **apparatus** shall be handed over to the **appointed operator** responsible for supervising the **work**.
- d) The **control officer** shall attach the names of the **appointed operators** to the **apparatus** on the **operating** diagram.

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- e) No **breaker** controlling the supply to the **apparatus** shall be reclosed after a **breaker** trip until the **control officer** has confirmed with the **appointed operators**, to whom the live **line** has been handed over, that it is safe to do so.
- f) All **work** shall be supervised by an **appointed operator** who shall ensure that minimum safe working clearances are maintained at all times.

When the minimum safe working clearance between persons, machinery or objects and live **apparatus** or **lines** cannot be maintained such live **apparatus** or **lines** shall be **isolated** and **earthed** as a **safety panel**.

5.3.6.4 MINIMUM SAFE WORKING CLEARANCES

A.C. Voltages

765kV – 6.0 m

400kV – 4.0 m

275kV – 3.0 m

220kV – 2.5 m

132kV – 2.0 m

88kV – 1.5 m

66kV – 1.3 m

1 – 44kV – 1.0 m

D.C. Voltages

600kV – 5.0 m

450kV – 4.0 m

300kV – 3.0 m

150kV – 2.0 m

NOTE: Any STAR point bushing will be treated in accordance with the nominal system voltage of the associated apparatus.

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5.4 RETURNING APPARATUS OR LINES TO SERVICE

5.4.1 UNDER NORMAL CONDITIONS

Before returning any **apparatus** or **line**, on which **work** has been carried out, to service the **appointed operator** shall first personally satisfy himself that all persons have been withdrawn from the **apparatus** or **line** and from all chambers and enclosures containing such **apparatus** or **line** and that any permanent barriers have been replaced.

The **appointed operator** shall then advise the **control officer** that the **work** has been completed and that he is handing back the **apparatus** or **line** in the state as handed out.

The **control officer** shall then remove the name of the **appointed operator** from the **apparatus** or **line** on the **operating** diagram and shall then issue instructions for the removal of all other **earths**. Where a **line** has been handed to more than one **appointed operator** no **control earths** shall be removed from the **line** until all **appointed operators** involved have reported the completion of their **work** and the removal of all **working earths** from their portion of the **line**.

When **work** is done at more than one place on a circuit, each **work permit** shall be cancelled by the issue of a clearance on the completion of each separate item of the **work**. No **earths** shall be removed from any portion of the **apparatus** or **line** until clearances have been received for all **work permits**, which were issued to work on the circuit.

Before finally returning the **apparatus** or **line** to service the **appointed operator** must ensure that all **prohibitory signs** and earthing labels which were affixed in accordance with regulation. 5.3.4 have been removed.

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5.4.2 WHEN THE APPOINTED OPERATOR IS NOT AVAILABLE

Should the time have come to return **apparatus** to service, but the **appointed operator** to whom the **apparatus** has been handed over for **work** is for any reason not available, the **control officer** shall consult with the relevant head of department, who shall then decide what other **appointed operator** shall be instructed to return the **apparatus** to service.

The relevant head of department shall take all reasonable steps to ensure that no dangerous condition arises from such transfer of responsibility.

5.5 EXCEPTION TO GENERAL PROCEDURE

5.5.1 WORK ON A LINE CONTROLLED FROM A SINGLE SOURCE OF SUPPLY

When **work** has to be done by an **appointed operator** on a **line** on the **distribution system** which is controlled from a single source of supply, the **appointed operator** may make complete arrangements with the **control officer** to **open, isolate and earth** the **line** and subsequently return it to service in accordance with regulations 5.4, with the exception that it will not be necessary to advise the **control officer** that **work** has been completed before the **line** is made alive.

5.5.2 REPLACING OF DROP-OUT FUSE ISOLATORS WITHOUT REFERENCE TO THE CONTROL OFFICER

An **appointed operator** may replace and close dropout fuse **isolators** without reference to the **control officer** once only. This shall not include replacing any dropout fuses should all fuses have blown, or when all fused **isolators** are found open.

The **control officer** shall be notified as soon as possible after the fuse has been replaced and closed.

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5.5.3 PIGGYBACK SYSTEM

When **work** has to be done on the piggyback system, all **lines** on the said structure shall be open, **isolated** and **earthed** and handed over in accordance with these regulations before **work** may commence on any one of these **lines**.

5.5.4 TOTAL SUBSTATION ISOLATION

Where total substation isolation is requested, the substation shall be isolated and **earthed** at all points of isolation.

The substation shall be handed over to one **appointed operator**, with permission to apply and remove **working earths** as required. The number of **working earths** that were applied and removed shall be declared at hand back.

5.6 SUPERVISION

5.6.1 ON THE GENERATION SYSTEM

Responsible persons will be held responsible for the safe execution of all **work** and activities as far as compliance with these regulations are concerned. The **workers register** shall be completed as per regulations 8.1.9.

5.6.2 ON THE DISTRIBUTION SYSTEM

Appointed operators or **responsible persons** will be held responsible for the safe execution of all **work** and activities as far as compliance with these regulations are concerned. The **workers register** shall be completed as per regulations 8.2.9.

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5.7 ABSENCE OF AUTHORISED PERSONS IN CHARGE OF SUPERVISION

When it is impossible for the **appointed operator** or the **responsible person** responsible for **supervision** to be present for the duration of the **work** in progress, this person shall, before departing, delegate the task of **supervision**, to another **appointed operator** or **responsible person**. The name of this **appointed operator** or **responsible person** must be recorded in the **work permit** and/or **workers register**. Should another **appointed operator** or **responsible person** not be available then all workers shall be withdrawn from the **work** during the absence of the **authorised person** in charge.

5.8 NO SWITCHING WHILE WORK IS IN PROGRESS IN A LIVE CHAMBER

Should any switching, other than **emergency switching**, be necessary at any station on **apparatus** in a **live chamber** in which inspection or maintenance **work** is in progress, all persons shall be withdrawn from the chamber until such **switching** has been completed. The relevant **control officer** shall be notified before persons enter **live chambers** at **substations** with supervisory control.

5.9 TESTING OF APPARATUS

5.9.1 ON THE GENERATION SYSTEM

5.9.1.1 TESTING APPARATUS – BEING ENERGISED FROM THE SYSTEM

Where it becomes necessary for the purpose of carrying out tests, to energise the **apparatus** from the system while such **apparatus** is in an abnormal condition.

The department concerned must make special arrangements with the official in charge so that the **operating** procedure can be agreed to beforehand.

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The existing **work permit/s**, on which work was performed, must be cleared.

A new **work permit** with the title “Test as per procedure under Regulation 5.9.1.1” must then be issued affecting the tests to be carried out, indicating and the state of **isolations** and **earths** required to carry out the tests.

It shall be the responsibility of the **responsible person** for each test to warn workers and temporarily withdraw the workers involved from the **apparatus** for the duration of the test.

The **operating** shall then be carried out in accordance with the agreed procedure and in accordance with the regulations in so far for as they apply.

The **operating** as per the agreed test procedure shall be done by the **appointed operator** in conjunction with the **responsible person**.

For the purpose of this regulation, an abnormal condition is one in which the **apparatus** is not in a condition to take normal load owing to jumpers being broken or to temporary connections having been made, protection settings not verified, any protection **out of commission**, temporary **earths** applied, or some similar reason.

5.9.1.2 TESTING APPARATUS – NOT BEING ENERGISED FROM THE SYSTEM

Testing of **apparatus** as per this regulation may be done on the original **work permit** provided that the testing has been indicated on the scope of **work** and the **risk assessment** determines that it is safe.

If the **risk assessment** indicates the need for a new **work permit**, this new **work permit** must be taken out under regulation 5.9.1.2.

If it is necessary, for the purpose of carrying out testing to energise the **apparatus**, from a source other than from the system, the department

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concerned must make special arrangements with the official in charge so that the test procedure can be agreed to beforehand. The test procedure must be attached to the **work permit**.

It shall be the responsibility of the **responsible person** for each test to warn workers and temporarily withdraw the workers involved from the **apparatus** for the duration of the test.

The **operating** shall then be carried out in accordance with the agreed procedure and in accordance with the regulations in so far as they apply.

The **operating** as per the agreed test procedure shall be done by the **appointed operator** in conjunction with the **responsible person**.

5.9.2 ON THE DISTRIBUTION SYSTEM

Where it is necessary for tests to be carried out on **apparatus**, the **control officer** shall issue instructions for the **apparatus** to be **isolated** and **earthed** in accordance with regulation 5.3, after which he shall permit the **appointed operator** to remove the **earths**, if necessary, for the specific tests. Where a **work permit** has been issued the **appointed operator** may then only remove such **earths** under the **supervision** of the **responsible person**.

It shall be the responsibility of the **responsible person** or **appointed operator** carrying out the tests to warn workers and where necessary, temporarily withdraw workers from the **apparatus** for the duration of the tests.

On completion of the tests the **earths** shall be replaced by the **appointed operator** under the **supervision** of the **responsible person** and the **control officer** shall be informed that the **apparatus** has been restored to the original condition as stipulated on the **work permit**.

If it is necessary, for the purpose of carrying out testing, to energise the **apparatus** from the system while such **apparatus** is in an abnormal condition, the department concerned must make special

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arrangements with the official in charge so that the **operating** procedure can be agreed to beforehand.

This agreed **operating** shall then be carried out in accordance with these regulations in so far as they apply.

For the purpose of this regulation, an abnormal condition is one in which the **apparatus** is not in a condition to take normal load owing to jumpers being broken or to temporary connections having been made or protection settings not verified, any protection **out of commission**, temporary **earths** applied, or some similar reason.

5.10 SECTIONALISING FOR FAULT FINDING ON MV NETWORKS

Sectionalising of the network may be performed by the opening and closing of **breakers, switches** and **isolators** in order to locate a faulty section of the network following a **Permission to sectionalise** instruction from the **control officer** at the appropriate control **centre**.

SECTION 6 ABNORMAL CONDITIONS

6.1 ABNORMAL CONDITIONS TO BE REPORTED TO THE CONTROL OFFICER

In the event of any failure or interruption of supply to any part of the **power system** owing to whatever cause, or should any abnormal conditions arise, including signs of approaching inclement weather, the **control officer** must be advised as soon as possible.

6.2 EMERGENCY SWITCHING

Any person is permitted to carry out **emergency switching**.

In the event of any **emergency switching** having been carried out, the **control officer** must be informed as soon as possible.

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6.3 COMMUNICATION SYSTEM

Messages to and from **control officers** shall take precedence at all times in accordance with regulation 2.6.

During periods of abnormal system conditions, the **control officer** may interrupt calls or messages not relating to the control of the **power system**.

6.4 RESTORATION OF SUPPLY IN THE EVENT OF FAILURE OR ABSENCE OF COMMUNICATION.

In cases where communication with the **control officer** cannot be established, **appointed operators** may, at their discretion, close **breakers** once only in order to resume supply. Where two or more **feeders** enter a substation, only the **breakers** of **feeders** originating from one point may be closed without the permission of the **control officer**.

The closing of a **breaker** to resume supply shall be reported to the **control officer** as soon as possible thereafter.

6.5 ESTABLISHMENT OF A TEMPORARY CONTROL CENTRE

If necessary, a temporary local **control centre** may be established by an **authorised person** who will assume the duties of the **control officer** over the areas affected.

A temporary local **control centre** shall only be established after:

- a) the **control officer** has given permission or after all efforts to contact the **control officer** have failed.
- b) all **appointed operators operating** in the area affected have been advised that a temporary local **control centre** is to be established.

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During this period all **operating** must be logged. When communications or normal conditions have been restored, the **control officer** must be given full details of **operating** as well as the positions and status of all **breakers, isolators, and earthing gear**.

The person acting as local **control officer** shall be responsible for the operation of such local section of the **power system**, in accordance with these regulations, but shall not personally carry out any **operating**.

SECTION 7 LIVE WORK

7.1 AUTHORISED PERSONS TO BE IN CHARGE OF AND TO PERFORM LIVE WORK

7.1.1 PERSONS IN CHARGE OF LIVE WORK

Only those persons who have been specifically authorised to be in charge of **live work** shall take over live **apparatus** for **live working** and issue a **live work** declaration form.

7.1.2 PERSONS WHO MAY PERFORM LIVE WORK

Only those persons who have been specifically authorised may be permitted to perform **live work**.

An exception to the above requirement is that unauthorised persons may be permitted to perform live work whilst undergoing training, provided that such persons are under the supervision of an instructor authorised in terms of regulation 7.1.1.

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7.2 LIVE WORK ON THE DISTRIBUTION SYSTEM

7.2.1 PREPARATION AND HANDING OVER OF APPARATUS FOR LIVE WORK

When **live work** is to be carried out on any **high-voltage apparatus**, the **authorised person** in charge of the **live work** shall notify the **control officer** of the following:

- a) the **apparatus** to be worked on
- b) the nature of the **work** to be carried out.
- c) the time that the **work** is to commence and the estimated duration of the **work**.

The **authorised person** in charge of the **live work** shall arrange with the **control officer** for **live work warning notices** to be affixed to all control panels of **breakers** controlling the supply to the **apparatus** concerned and for all auto-reclosing features on these **breakers** to be switched off or otherwise made inoperative

7.2.1.1 WORK ON LINES

Where the auto-reclose function of a **line** is made inoperative via supervisory, it will not be necessary to apply a **live work** warning notice to the **control panel**. If the auto-reclose is rendered inoperative manually, the live work warning notice shall be applied. **Live work warning notices** shall be **tagged** on all Supervisory Control and Data Acquisition systems irrespective of the method used to render the auto-reclose inoperative.

When **live work** warning notices have been affixed to all control panels of **breakers** controlling the supply to the **apparatus** concerned and all auto-reclosing features on these **breakers** have been switched off or made inoperative, the **control officer** will inform the **authorised person** in charge of the **live work** that this has been done and shall then hand over the **apparatus**.

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For **live work** on **lines** of 33kV and below, it may not be necessary for auto-reclose features to be switched off or otherwise made inoperative. The **controller** must then record this, and a **live work warning notice** must be displayed on Supervisory Control and Data Acquisition. It will not be necessary to apply a **live work** warning notice to the control panel, provided all **work** is done in strict accordance with the applicable standards for **live work**.

7.2.1.2 WORK IN SUBSTATIONS

All **feeders** controlling the supply to the **apparatus** to be worked on (up to 132 kV) will have both the local and remote auto-reclose features switched off or made inoperative either via supervisory or manually.

Where the auto-reclose function of a **line** is made inoperative via supervisory, it will not be necessary to apply a **live work warning notice** to the **control panel**. If the auto-reclose is rendered inoperative manually, the live work warning notice shall be applied. **Live work warning notices** shall be **tagged** on all Supervisory Control and Data Acquisition systems irrespective of the method used to render the auto-reclose inoperative.

When **live work** warning notices have been affixed to all control panels of **breakers** controlling the supply to the **apparatus** concerned and all auto-reclosing features on these **breakers** have been switched off or made inoperative, the **control officer** will inform the **authorised person** in charge of the **live work** that this has been done and shall then hand over the **apparatus**.

7.2.2 RESTRICTIONS ON RECLOSING BREAKERS

When the **control officer** has handed over **apparatus** for **live work**, the name of the **authorised person** in charge of the **live work** shall

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be affixed to the **operating diagram** in the **control centre**. No **operating** other than the **opening of breakers** shall be performed on the **breakers** controlling supply to the **apparatus**.

During the time that the **apparatus** is handed over, no **breaker** which controls the supply to the **apparatus** and which has tripped or been opened for any reason, shall be reclosed until such time as the **authorised person** in charge and the **control officer** has mutually agreed that it is safe for the **breaker** to be reclosed.

7.2.3 LIVE WORK DECLARATION FORM

7.2.3.1 CIRCUMSTANCES REQUIRING A LIVE WORK DECLARATION FORM

A **live work declaration form** is required for all **live work** on **live, high-voltage apparatus** at any place on the **distribution system**.

7.2.3.2 ISSUE OF A LIVE WORK DECLARATION FORM

The **authorised person** in charge of **live work**, to whom the **control officer** has handed over **apparatus** for **live work**, shall explain to all the persons who will be engaged in the **live work** the arrangements made with the **control officer**. The **authorised person** in charge of the **live work** shall:

- a) identify the **apparatus** to be worked on,
- b) the operational voltage of the **apparatus** to be **worked** on and
- c) the corresponding safe working clearances to be maintained.

The **authorised persons** to be engaged in the **live work** shall acknowledge their understanding of these details and restrictions by signing the **live work declaration form**. They may then proceed with the **work**.

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7.2.3.3 CLEARANCE OF THE LIVE WORK DECLARATION FORM

When **live work** has been completed, or is suspended for any reason, and the **apparatus** is to be returned to normal service, the **authorised person** in charge of the **live work** shall:

- a) withdraw all personnel from the live **apparatus**. He shall remove all tools and equipment to a safe position in relation to the live **apparatus**.
- b) advise the **authorised persons** who were engaged in the **live work** that the **apparatus** is to be handed back to the **control officer** and that no further work may be performed.
- c) notify the **control officer** that **live work** is complete or otherwise the exact state of the **apparatus** and whether tools or equipment have been left on the **apparatus**.
- d) complete and sign the clearance section of the **live work declaration form**.

7.2.3.4 DURATION OF A LIVE WORK DECLARATION

It is the responsibility of the **authorised person** in charge of the **live work** to decide when conditions are such that **live work** can no longer proceed safely and the **live work declaration** shall be cleared as provided for in regulation 7.2.3.3.

7.2.3.5 RETENTION OF FORMS

Live work declaration forms related to complete or suspended **live work** shall be retained at the headquarters of the persons authorised for **live work** for a period of three months before being destroyed.

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7.2.4 WHEN THE AUTHORISED PERSON IN CHARGE OF LIVE WORK IS NOT AVAILABLE

If the **authorised person** in charge to whom **apparatus** has been handed over is for any reason not available, another person authorised in terms of regulations 7.1.1 shall take over the responsibilities of the **authorised person** in charge of the **live work**.

This person shall countersign the **live work declaration form** to indicate that he is fully aware of what must be done on the **apparatus** and take over the **apparatus** from the **control officer**. The **control officer** shall remove the name of the original **authorised person** in charge from the **operating** diagram in the **control centre** and shall record the name of the new **authorised person** in charge of the **live work**.

7.3 SUPERVISION OF LIVE WORK

The **authorised person** in charge of **live work** will be held responsible for the safe execution of **live work** in so far as these regulations and the standards for **live work** are concerned.

The **authorised person** in charge of **live work** shall at all times observe the work in progress to ensure that it is carried out in a safe manner. When the **authorised person** in charge of **live work** needs to withdraw from the work site, he shall hand back the **apparatus** to the **control officer** and regulation 7.2.4 shall apply.

Where the **authorised person** in charge of **live work** cannot observe part of the **work**, observation of that area of activity shall be delegated to another person authorised in terms of regulation 7.1.1.

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SECTION 8: WORK PERMIT SYSTEM

8.1 WORK AT POWER STATIONS CARRIED OUT UNDER A WORK PERMIT

8.1.1 CIRCUMSTANCES REQUIRING A WORK PERMIT

Risk Assessments and **pre-work checklists** must be completed for all work under any **work permit**.

The **responsible person** must complete the **pre-work checklist** in conjunction with the **workers register**. The **risk assessment** shall be initiated and conducted by the **responsible person** in concurrence with the **appointed operator**.

A **work permit** is required for all **work** on **apparatus** in **restricted** or **prohibited areas** by any person.

If the original scope of **work** changes, the original **work permit** must be cleared, and a new **work permit** shall be issued.

No **work** shall be allowed on **apparatus** in a **live chamber**. Refer to 5.2.1.

8.1.2 FORMS IN DUPLICATE

Work permit forms shall be made out in duplicate. The original shall be retained by the **responsible person** and the copy by the **appointed operator**

8.1.3 USE OF WORK PERMIT FORMS

8.1.3.1 APPLICATION AND WORK PERMIT

When **work** under the **work permit** procedure is to be carried out, the **responsible person** shall fill in and sign the application stating:

a) the **apparatus** required to be made **dead**.

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- b) the nature of the **work** to be carried out in detail.
- c) the points of isolation.
- d) the number and position of earthing gear required.
- e) the time and date on which the work is to be commenced.
- f) any special requirements including identified continuous assessment risks and hazards.
- g) the **risk assessment** number must be entered on the **work permit** application.
- h) the **workers register** number must be entered in the **work permit** application.

The **appointed operator** on duty shall verify that plant specific dangers and hazards have been identified on the **risk assessment form**. Where applicable, the **appointed operator** will sign acceptance of the **work permit** application and will make arrangements with the **control officer** to have the **apparatus isolated** and **earthed**.

The “test before touch” principle must be adhered to.

After the **isolating** and **earthing** has been done in accordance with these regulations both the **appointed operator** and the **responsible person** must satisfy themselves that the **apparatus** has been made safe to **work** on.

After signing and recording the time on the **work permit**, the **appointed operator** shall issue the **work permit** to the **responsible person** together with the **key safe** key and any keys necessary to give access to the **apparatus** concerned.

The **appointed operator** must now allow the **responsible person** to accept the **work permit** after reviewing of the **risk assessment form**.

The **responsible person** shall thereafter sign the **work permit** and shall then be deemed to have taken over the **apparatus** to be worked on.

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No alteration shall be allowed on an issued **work permit**.

8.1.3.2 CLEARANCE

On completion of any **work** for which a **work permit** has been issued, the **responsible person** shall ensure that:

- a) all workers who have been engaged in the **work** have been withdrawn from the **apparatus** or from any **prohibited** or **restricted area** concerned. This must be confirmed by the **responsible person** signing the appropriate section of the **workers register**.
- b) the **apparatus** can be returned to service safely and that all tools, debris, and loose material have been withdrawn from the area.
- c) all doors or gates giving access to the **apparatus** have been locked.

He shall then fill in and sign both copies of the clearance portion of the **work permit form** and shall then return any keys issued for access and the **key safe** key, together with the original of the **work permit form**, the **workers register** and all relevant documents to the **appointed operator**.

8.1.3.3 RETURN TO SERVICE

On receipt of the clearance, the **workers register** and all relevant documents, the **appointed operator** shall immediately complete the clearance by signing both copies and shall notify the **control officer**, where applicable, that he has received a clearance for the **apparatus**, which may then be returned to service in accordance with regulation 5.4.

8.1.3.4 NON – AVAILABILITY OF ORIGINAL FORM

If the original of the **work permit** form is not available when the clearance of such **work permit** is required, the appropriate head of

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department or, in the case of a non-employee, the site representative of that company, must confirm that all workers have been withdrawn from the workplace and the appropriate section of the **workers register** has been signed.

The **responsible person** should sign clearance of the **work permit** and the head of department must then countersign the copy of the **work permit**. This signature authorises the **appointed operator** to clear the **work permit** clearance in question.

8.1.3.5 NON – AVAILABILITY OF THE RESPONSIBLE PERSON

In the event of the responsible person to whom a work permit has been issued not being available to clear the work permit, the official in charge (the appropriate head of department or, in the case of a non-employee, the site representative of that company) shall decide which other responsible person shall clear the work permit.

Such responsible person shall first complete the “change of responsibility” portion on the computerised work permit form, a new workers' register must be completed, and review the risk assessment and counter sign the pre-work checklist, to indicate that he is fully aware of what was to be done on the apparatus.

He shall supervise the completion of the work, fill in and sign the clearance on the work permit form and return the work permit form and all relevant documents to the appointed operator concerned.

The appropriate head of department or, in the case of a non-employee, the site representative of that company shall take all reasonable steps to ensure that no dangerous condition arises from such transfer of responsibility.

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8.1.3.6 TRANSFER OF RESPONSIBILITY

In the event of another responsible person becoming responsible for the work, both the original and the copy of the work permit change of responsibility must be completed, as well as the workers' register, risk assessment and pre-work checklist, these must be endorsed with the date and time when the new responsible person assumes the responsibilities as the responsible person or new forms completed as required.

The change of responsibility section on the work permit form must be signed by both the outgoing and incoming responsible person.

8.1.4 ORIGINAL FORMS

All original **work permit forms** and all relevant documents shall be kept on completion of the **work** for which they were issued. Each completed **work permit** book containing the copies of **work permit forms** shall be returned to the office of the official in charge when a new book is taken into use. The completed book may be destroyed at the instructions of the official in charge after a lapse of one year, provided that no query has arisen regarding any entry contained in it.

8.1.5 DURATION OF WORK PERMITS

A **work permit** shall remain in force until it is cancelled by the issue of a clearance.

8.1.6 APPLICATION FORMS MADE OUT IN ADVANCE

Work permit applications may be filled in and signed by a **responsible person** at any time in advance of the time work will be started. The **appointed operator**, who will prepare the **apparatus** and issue the necessary **work permit** for the **work**, shall sign such application when the necessary **operating** is to be done.

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8.1.7 MULTIPLE WORK PERMITS

A **responsible person** may be issued with more than one **work permit** at a time, provided that an adequate level of **supervision** is provided at each place of **work** as determined by the risk assessment.

Each individual **work permit** must be issued with separate **workers registers, risk assessments and pre-work checklists.**

No worker may **work** under more than one **work permit** at a time.

8.1.8 WORK PERMITS ARE REQUIRED FOR EACH PORTION OF WORK

When it is necessary for **work** to be done on **apparatus** at a **power station** in more than one chamber on the same circuit, a separate **work permit** shall be issued for the work in each separate chamber.

8.1.9 WORKERS REGISTER

The **responsible person** shall explain the nature of the **work** covered by the **work permit, isolation** points and the dangers as per the **pre-work checklist**, attached thereto to all the workers who will be engaged in this **work**, and shall then complete the **workers register.**

The **workers register** shall be current at all times.

If work extends over a period of time especially more than one day or shift, on completion of **work** or at the end of shift, the **workers register** must be signed off. When the **work** resumes on the next day or the next shift, a new **worker register** must be signed. This is also applicable when a person is delegated from one Job / Work to another.

This regulation shall be read in conjunction with regulation 5.6.1

The “test before touch” principle must be adhered to.

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8.1.10 COMPUTERISED WORK PERMIT SYSTEM

In the case of a computerised **work permit** system, the **responsible person** in charge of the **work** must log onto the computerised **work permit** system using an authorised password only.

The **responsible person** or **appointed operator** must fill in the permit application section stating:

- a) the **apparatus** required to be made dead,
- b) the nature of the **work** to be carried out in detail,
- c) the points of **isolation**,
- d) the number and position of **earths** required,
- e) any special requirements including identified dangers and hazards,
- f) the time and date on which the **work** must commence and
- g) the **risk assessment** number must be entered on to the **work permit** prior to printing.

the **workers register** number must be entered on to the **work permit** prior to printing.

After **isolation** by the **appointed operator**, the **responsible person** must first sign the application section of the **work permit**, ensuring the correctness of the **apparatus** detail, the job detail and the dangers stipulated.

After signing the application, the **responsible person** shall then ensure that the **isolations** and **earths** as specified on the **work permit** have been correctly applied and that it is safe to carry out the **work** as detailed.

The remainder of regulation 8.1.3 shall then apply.

All original **work permit forms** and all relevant documents shall be kept on completion of the **work** for which they were issued. The copies

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of **work permit forms** shall be returned to the office of the official in charge and destroyed at the instructions of the official in charge after a lapse of one year, provided that no query has arisen regarding any entry contained in it.

The **work permit**, original and copy shall be printed once.

8.1.11 FIRE ON ELECTRICAL APPARATUS

The **appointed operator** must isolate the **apparatus** from all points of supply.

Inform the Fire Station Official that the **apparatus** is safely **isolated** and that he may now extinguish the fire.

After the above has been completed the **responsible person** and the **appointed operator** must complete the **work permit forms** as required for normal isolation purposes.

8.2 WORK ON THE DISTRIBUTION SYSTEM CARRIED OUT UNDER A WORK PERMIT

8.2.1 CIRCUMSTANCES REQUIRING A WORK PERMIT

Except as provided for in regulation 8.2.7, a **work permit** is required for all **work** on **apparatus** performed in **live chambers, prohibited areas** or **restricted areas** or at any place on the **distribution system**, and may only be issued to a **responsible person**.

If the original scope of work changes, the original work permit must be cleared, and a new work permit shall be issued.

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8.2.2 FORMS IN DUPLICATE

Work permit forms shall be made out in duplicate. The **responsible person** shall retain the original and the copy shall be left in the **work permit** book, which shall be retained by the **appointed operator**.

8.2.3 USE OF WORK PERMIT FORMS

8.2.3.1 ISSUES OF WORK PERMITS

Where **work** on **apparatus** requires a work permit it shall only be issued for **apparatus** that has been **isolated, earthed** and handed over in accordance with these regulations.

The **appointed operator**, to whom the **apparatus** or **line** has been handed over, shall fill in the **work permit form** stating the **apparatus**, the nature of the **work** to be carried out and the date and time.

Both the **appointed operator** and the **responsible person** shall agree at the place of **work** that the **apparatus** has been made safe to **work** on. If they are both satisfied, they will both sign the permit section. The **appointed operator** will issue the **work permit** to the **responsible person** and give him access.

At this point, it is deemed that the **responsible person** has taken over the **apparatus** to **work** on.

8.2.3.2 CLEARANCE

On completion of **work** and after all persons have been withdrawn, the **responsible person** shall fill in and sign the clearance section of the **work permit form**, after which he shall hand the form to the **appointed operator**.

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8.2.3.3 RETURN TO SERVICE

On receipt of the signed clearance, the **appointed operator** shall complete the clearance by signing it and, where necessary, hand back the **apparatus** to the **control officer**.

The **apparatus** may then be returned to service in accordance with these regulations.

8.2.3.4 NON – AVAILABILITY OF ORIGINAL FORM

If the original of the **work permit form** is not available when the clearance of such **work permit** is required, the copy of the permit shall be endorsed and signed stating that the original form is lost.

8.2.3.5 NON – AVAILABILITY OF THE RESPONSIBLE PERSON

In the event of the **responsible person** to whom a **work permit** has been issued not being available to clear the **work permit**, the official in charge shall decide which other **responsible person** shall clear the **work permit**.

Such **responsible person** shall first countersign the **work permit** to indicate that he is full aware of what was to be done on the **apparatus**. He shall **supervise** the completion of the **work**, fill in and sign the clearance on the **work permit form** and return the **work permit form** to the **appointed operator** concerned.

8.2.4 ORIGINAL FORMS

All original **work permit forms** and completed **work permit** books shall be retained for a period of one year's before being destroyed.

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8.2.5 DURATION OF WORK PERMITS

A **work permit** shall remain in force until it is cancelled by the issue of a clearance.

8.2.6 MULTIPLE WORK PERMITS

A **responsible person** may be issued with more than one **work permit** at a time, provided that an adequate level of **supervision** is provided at each place of **work**.

No worker may **work** under more than one **work permit** at a time.

8.2.7 CASES WHERE A WORK PERMIT IS NOT REQUIRED

- a) No **work permit** is required when **work** is carried out on **apparatus** by **appointed operators** and by persons working under their **supervision**.
- b) No **work permit** is required when specific activities are being carried out in a **prohibited area** by persons authorised for this duty.

8.2.8 WORKING ON APPARATUS INVOLVING CUSTOMERS AND CONTRACTORS

8.2.8.1 Where it is necessary for Eskom to **isolate** and make safe the supply to **apparatus** for a customer or contractor to enable them to **work** on such **apparatus**, a **work permit form** shall be used.

The representative from the customer or contractor shall sign the **work permit form** as the **responsible person**.

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8.2.8.2 Where **apparatus** is to be **isolated** by a customer, who has no established **control centre** and there is a possible back feed into the Eskom system, it will be the responsibility of the **appointed operator**, to ensure that the **isolation** remains in force for the period that the Eskom work is in progress.

8.2.8.3 If the customer has a recognised **control centre**, the **work permit** procedure need not apply, and all required **operating** shall be effected between the **control centres** concerned.

8.2.9 WORKERS REGISTER

The **appointed operator** or **responsible person** shall explain the nature of the **work** and the **dangers** attached thereto to all the workers who will be engaged in this **work** and shall then complete the **workers register**.

The **workers register** shall always be current at all times.

This regulation shall be read in conjunction with regulation 5.6.2.

SECTION 9 NON-ELECTRICAL ACTIVITIES ON LIVE LINES

9.1 AUTHORISED PERSONS TO BE IN CHARGE OF AND TO PERFORM NON-ELECTRICAL ACTIVITIES ON LIVE LINES

9.1.1 PERSONS IN CHARGE OF NON-ELECTRICAL ACTIVITIES ON LIVE LINES

Only those persons who have been specifically **authorised** to be in charge of **non-electrical activities** shall take over a **live line** for **non-electrical**

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activities and issue a **Declaration Form for Non-Electrical Activities on Live Lines**.

9.1.2 PERSONS WHO MAY PERFORM NON-ELECTRICAL ACTIVITIES ON LIVE LINES

Only those persons who have been specifically **authorised** may be permitted to perform **non-electrical activities**.

An exception to the above requirement is that unauthorised persons may be permitted to perform **non-electrical activities** whilst undergoing training, provided that such persons are under the **supervision** of a person **authorised** in terms of regulation 9.1.1.

9.2 NON-ELECTRICAL ACTIVITIES ON LIVE LINES ON THE DISTRIBUTION SYSTEM

9.2.1 PREPARATION AND HANDING OVER OF APARATUS FOR NON-ELECTRICAL ACTIVITIES ON LIVE LINES

When **non-electrical activities** are to be carried out on any **line** that is **alive**, the **authorised person** in charge of the **non-electrical activities** shall notify the **control officer** of the following:

- a) the **line** on which the **non-electrical activities** will take place
- b) the nature of the **non-electrical activities** to be carried out
- c) the time that the **non-electrical activities** are to commence and the estimated duration thereof.

The **authorised person** in charge of the **non-electrical activities** shall arrange with the **control officer** for **warning notices** to be affixed to all **control panels** of **breakers** controlling the supply to the **line** concerned and for all auto-reclosing features on these **breakers** to be switched off or otherwise made inoperative.

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Where the auto-reclose function of a **line** is made inoperative via supervisory, it will not be necessary to apply a **warning notice** to the **control panel**. If the auto-reclose is rendered inoperative manually, the **warning notice** shall be applied. **Warning notices** shall be **tagged** on all Supervisory Control and Data Acquisition systems irrespective of the method used to render the auto-reclose inoperative.

When **warning notices** have been affixed to all **control panels** of **breakers** controlling the supply to the **line** concerned and all auto-reclosing features on these **breakers** have been switched off or made inoperative, the **control officer** will inform the **authorised person** in charge of the **non-electrical activities** that this has been done and shall then hand over the **line** to the **authorised person** in charge of **non-electrical activities**.

9.2.2 RESTRICTIONS ON RECLOSING BREAKERS

When the **control officer** has handed over a **line** for **non-electrical activities**, the name of the **authorised person** in charge of the **non-electrical activities** shall be affixed to the **operating diagram** in the **control centre**. No **operating** other than the **opening** of **breakers** shall be performed on the **breakers** controlling supply to the **line** until the **authorised person** has handed back the **line** to the **control officer**.

During the time that the **line** is handed over, no **breaker** which controls the supply to the **line** and which has tripped for any reason, shall be reclosed until such time as the **authorised person** in charge of the **non-electrical activities** has contacted the **control officer** and has stated that it is safe for the **breaker** to be reclosed.

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9.2.3 DECLARATION FORM FOR NON-ELECTRICAL ACTIVITIES ON LIVE LINES

9.2.3.1 CIRCUMSTANCES REQUIRING A DECLARATION FORM FOR NON-ELECTRICAL ACTIVITIES ON LIVE LINES

A **Declaration Form for Non-Electrical Activities on Live Lines** is required for all **non-electrical activities** on **live lines** at any place on the **distribution system**.

9.2.3.2 CIRCUMSTANCES REQUIRING A DECLARATION FORM FOR NON-ELECTRICAL ACTIVITIES ON LIVE LINES

The **authorised person** in charge of **non-electrical activities**, to whom the **control officer** has handed over a **line** for **non-electrical activities**, shall explain to all the **authorised persons** who may perform and will be engaged in the **non-electrical activities** the arrangements made with the **control**

officer. The **authorised person** in charge of the **non-electrical activities** shall:

- a) identify the line for the execution of non-electrical activities,
- b) the operational voltage of the line and
- c) the corresponding **safety clearance** or **minimum approach distance** to be maintained.

The **authorised persons** who may perform and will be engaged in the **non-electrical activities** shall acknowledge their understanding of these details and restrictions by signing the **Declaration Form for Non-Electrical Activities on Live Lines**. They may then proceed with the **non-electrical activities**.

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9.2.3.3 CIRCUMSTANCES REQUIRING A DECLARATION FORM FOR NON-ELECTRICAL ACTIVITIES ON LIVE LINES

When **non-electrical activities** have been completed, or is suspended for any reason, and the **line** is to be returned to normal service, the **authorised person** in charge of the **non-electrical activities** shall:

- a) withdraw all personnel from the **live line**. He shall remove all tools and equipment to a safe position in relation to the live line.
- b) **activities** shall advise the **authorised persons** who were engaged in the **non-electrical activities** that the **line** is to be handed back to the **control officer** and that no further activity may be performed.
- c) shall notify the **control officer** that **non-electrical activities** are complete or otherwise the exact state of the **line** and whether tools or equipment have been left on the **line**.
- d) shall complete and sign the clearance section of the **Declaration Form for Non-Electrical Activities on Live Lines**.

9.2.3.4 DURATION OF A DECLARATION FOR NON-ELECTRICAL ACTIVITIES ON LIVE LINES

It is the responsibility of the **authorised person** in charge of the **non-electrical activities** to decide when conditions are such that **non-electrical activities** can no longer proceed safely and the **Declaration for Non-Electrical Activities on Lines** shall be cleared as provided for in regulation 9.2.3.3.

9.2.3.5 RETENTION FORMS

Declaration Forms for Non-Electrical Activities on Live Lines related to complete or suspended **non-electrical activities** shall be retained at the

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headquarters of the persons **authorised** for **non-electrical activities** for a period of three months before being destroyed.

9.2.4 WHEN THE AUTHORISED PERSON IN CHARGE OF NON-ELECTRICAL ACTIVITIES ON LIVE LINES IS NOT AVAILABLE

If the **authorised person** in charge to whom a **line** has been handed over is for any reason not available, another person authorised in terms of regulations 9.1.1 shall take over the responsibilities of the **authorised person** in charge of the **non-electrical activities**.

This person shall countersign the **Declaration Form for Non-Electrical Activities on Live Lines** to indicate that he is fully aware of what must be done on the **line** and take over the **line** from the **control officer**. The **control officer** shall remove the name of the original **authorised person** in charge from the **operating** diagram in the **control centre** and shall record the name of the new **authorised person** in charge of the **non-electrical activities**.

9.3 SUPERVISION OF NON-ELECTRICAL ACTIVITIES ON LIVE LINES

The **authorised person** in charge of **non-electrical activities** will be held responsible for the safe execution of **non-electrical activities** in so far as these regulations and the standards for **non-electrical activities** are concerned.

The **authorised person** in charge of **non-electrical activities** shall at all times observe the activity in progress to ensure that it is carried out in a safe manner. When the **authorised person** in charge of **non-electrical activities** needs to withdraw from the activity site, he shall hand back the **line** to the **control officer** and regulation 9.2.4 shall apply.

Where the **authorised person** in charge of **non-electrical activities** cannot observe part of the activity, observation of that area of activity shall be delegated to another person **authorised** in terms of regulation 9.1.1.

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Development Team

This document has been developed and reviewed by the National ORHVS Care Group in collaboration with the various Study Groups in the Transmission, Distribution, Generation and Enterprises Divisions and has been read and accepted by the following line group representatives:

Names	Group
Gerhard Van Rheede	Generation
Derik Sadler	Transmission
Sean Murphy	Generation
David Strauss	Distribution
Louis Du Plessis	National Control
Timothy Zulu	SOC Control
Raj Rajkumar	NORHVS CG Convenor

Note: This document is a revision of 240-114967625

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ANNEXURES

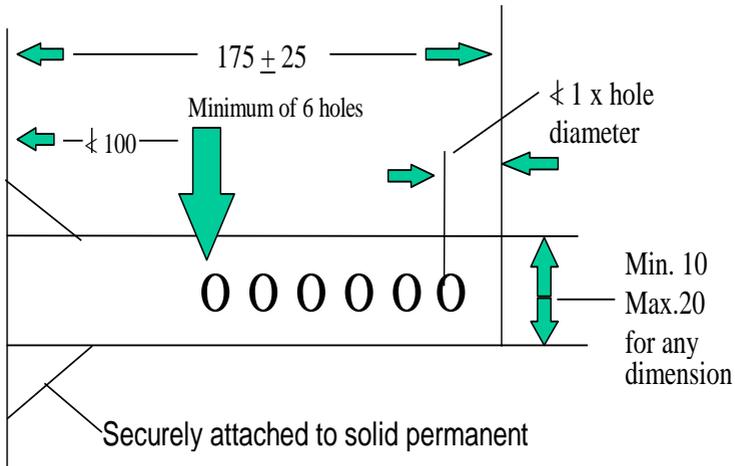
Annexures 1-14 are minimum requirements, which means that the format may be changed and site-specific needs added to these requirements, but the minimum is mandatory.

Annexures 15 and 16 are mandatory.

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SECTION 10 ANNEXURES

- GENERAL REQUIREMENTS FOR A KEY SAFE



Dimensions in millimeters

Material: Steel

Holes: Clearance size for Safety Lock

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ANNEXURE 2: LIVE WORK DECLARATION FORM

DECLARATION BY AUTHORISED PERSON IN CHARGE OF LIVE WORK

I, the undersigned authorised person in charge of live work confirm that:
 In terms of Regulation 7.2.1 all auto-reclosing features of the breaker(s) controlling the supply to:

.....
 have been made inoperative, warning notices *have / have not been affixed to the control panels of the breaker(s) concerned, and the apparatus is handed over to me for live work, and that :

the operational voltage is

the safe working clearance is

live work to be done is

.....

Date Time Auth Person Print Name

DECLARATION BY PERSONS AUTHORISED TO PERFORM LIVE WORK

We, the undersigned persons authorised to perform live work, confirm that the apparatus to be worked on is as stated above and that we understand the details and restrictions of the work to be carried out.

Date Time Auth. person Print name

Date Time Auth. person Print name

Date Time Auth. person Print name

Date Time Auth. person Print name

Date Time Auth. person Print name

CLEARANCE BY PERSON AUTHORISED IN CHARGE OF LIVE WORK

Live work on the above-mentioned apparatus has been *completed/suspended.
 The persons authorised to perform live work have been withdrawn from the apparatus and the apparatus is handed back to the control officer.

Date Time Auth. person Print name

* Delete whichever is not applicable.

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ANNEXURE 3 - WORK PERMIT FORM FOR USE AT POWER STATIONS

	OPERATING REGULATIONS FOR HIGH VOLTAGE SYSTEMS HV WORK PERMIT	DOCUMENT REFERENCE ORHVS	Page /		
Station:	Department:	Job / Deviation No:	PERMIT No:		
APPARATUS TO BE WORKED ON	WORK TO BE CARRIED OUT	HAZARDS & PRECAUTIONS			
PLANT CODE	POINT OF ISOLATION	LOCATION	STATUS	KEY	OPS
	1.				
	2.				
	3.				
	4.				
	5.				
	6.				
	7.				
	8.				
	9.				
	10.				

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PLANT CODE		POINT OF EARTH		LOCATION	STATUS	KEY	OPS	
	1.							
	2.							
	3.							
	4.							
	5.							
	6.							
	7.							
	8.							
TOTAL NUMBER OF EARTH FITTED								
PERMIT APPLICATION			ISOLATIONS EFFECTED			PERMIT ISSUED		
D		T	D		T	D		T
APPLICATION COMPLETED BY			APPOINTED OPERATOR		SIGNATURE		APPOINTED OPERATOR	SIGNATURE
RESPONSIBLE PERSON			SIGNATURE		KEY SAFE NO	SAFETY LOCK NO	CLEARANCE BY RESPONSIBLE PERSON	
SCHEDULED BY			PERMIT TAKEN OUT			D		T
					RESPONSIBLE PERSON		SIGNATURE	
OPERATING APPROVED BY			D		T			CLEARANCE BY APPOINTED OPERATOR
					RESPONSIBLE PERSON		SIGNATURE	
TARGET COMPLETION			* See overleaf for abbreviations and Important notice			D		T
						APPOINTED OPERATOR		SIGNATURE
D		T						

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CHANGE OF RESPONSIBILITY FOR WORK PERMIT

1 st Change of Responsibility					
OUTGOING RESPONSIBLE PERSON			INCOMING RESPONSIBLE PERSON		
Date		Time		Date	
	Name		Signature		Name
					Signature
2 nd Change of Responsibility					
OUTGOING RESPONSIBLE PERSON			INCOMING RESPONSIBLE PERSON		
Date		Time		Date	
	Name		Signature		Name
					Signature
3 rd Change of Responsibility					
OUTGOING RESPONSIBLE PERSON			INCOMING RESPONSIBLE PERSON		
Date		Time		Date	
	Name		Signature		Name
					Signature
4 th Change of Responsibility					
OUTGOING RESPONSIBLE PERSON			INCOMING RESPONSIBLE PERSON		
Date		Time		Date	
	Name		Signature		Name
					Signature
ABBREVIATIONS THAT CAN BE USED TO INDICATE ISOLATION STATUS					
ABBREVIATION	DESCRIPTION	COMPONENT	ABBREVIATION	DESCRIPTION	COMPONENT
R/O+L	Racked out and locked	Breaker/isolator	Test	In test position	Breaker/isolator
R/O	Racked out	Breaker/isolator	F/W	Fuses withdrawn	Fuse
BdE+L	Board earthed and locked	Breaker,contactor, device	C/L	Cabinet locked	Cabinet
CaE+L	Cable earthed and locked	Breaker,contactor, device	FW+CL	Fuses withdrawn, barrier/cabinet locked	Fuse Holder
StE+L	Stator earthed and Locked	Machine bars, Stator windings	L/O+CF	Locked open and control fuses withdrawn	Breaker Isolator
PEA+L	Portable earth applied and labelled	Busbar			

Date: _____ Key safe No _____

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ANNEXURE 6: GENERATION ORHVS PRE-WORK CHECKLIST

	ORHVS Pre-Work Check List	

Apply STAR and perform 3-Way Communication, review and update Risk Assessment as required

	Y	N	N/A		Y	N	N/A
Workers briefed on hazards identified on the Risk Assessment?				If scaffold is to be used – has it been certified fit for purpose?			
Informed workers of the need to adhere to the work scope?				Do you require a "Hot Work Approval" safety assurance certificate?			
Has the Workers Register been filled in?				Is the work place free of toxic material / hazardous materials?			
Are workers wearing the correct Arc Flash clothing?				Are you equipped to store new or disconnected parts?			
Is there any other energized apparatus in the immediate work area?				Will a crane be required, if so has the Risk Assessment considered this risk?			
If entering a normally classified Live chamber, has it been isolated and earthed?				Are floor openings barricaded by means of a physical barrier?			
Has the apparatus that is to be worked on been positively identified?				Ensure a Test before Touch principle is observed at all times.			
Are there other permits on the same apparatus to be worked on?				Have you noted where the nearest working telephone is?			
Are all isolation points adequately indicated with a prohibitory sign?				Site EMERGENCY telephone number? ()			
Are all conductors to be worked on / touched adequately earthed?				Are you equipped for a potential oil spill?			
Is all test equipment to be used in calibration?				Is there a potential PCB (polychlorinated biphenyls) hazard?			
Are accesses and escape routes clear and is safety equipment accessible close to the work area?				Has work site risks changed? <i>If so revisit the Risk Assessment.</i>			
Is access control to the Prohibited / Restricted Area in place?				Other Considerations:			
Is work area adequately barricaded to prevent unauthorized entry?							

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	Y	N	N/A		Y	N	N/A
Is work area adequately barricaded to prevent unauthorized entry?							
Does your work permit allow you to leave ground level if required?							
Are you equipped to ensure foreign material exclusion?							
Is free standing equipment secured from falling?							
Are there any tripping hazards?							
Do you need to inform the Control Room before starting work?							
Is there adequate fresh air and light available at the work site?							

RESPONSIBLE PERSON. WITHDRAWAL

The above Pre-Work Check List has been completed by me.

NAME	SIGN	TIME	DATE

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ANNEXURE 7: GENERATION HV AUTHORISATION FORM

AUTHORISATION

	GENERATION AUTHORISATION CERTIFICATE	No:
---	---	-----

AUTHORISATION AS AN xxxxxxxxxxxxxxxxxxxx

NAME:		UNIQUE / ID No:	
-------	--	-----------------	--

DEPARTMENT:		DESIGNATION:	
-------------	--	--------------	--

In terms of Eskom's Operating Regulations for High Voltage Systems, authorised Procedures and Policies, you are hereby authorised to perform the following duties and functions.

1.
2.
3.

On the following Apparatus / Plant or specific area:

--

At Power Station:

--

Date authorised:		Date of expiry:	
------------------	--	-----------------	--

Authorisation Recommended by:

Name:		Designation:	
Sign:		Date:	

Authorisation Approved by:

Name:		Designation:	
Sign:		Date:	

Authorisation Accepted by:

Name:		Designation:	
Sign:		Date:	

The authority detailed above is understood by me and I accept the duties and responsibilities set out therein.

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**ANNEXURE 8– WORK PERMIT FORM FOR USE ON THE
DISTRIBUTION / TRANSMISSION SYSTEM**

OPERATING REGULATIONS FOR HIGH-VOLTAGE SYSTEMS

WORK PERMIT FORM
(DISTRIBUTION / TRANSMISSION)

SITE: _____

APPARATUS TO BE WORKED ON:

WORK TO BE CARRIED OUT:

PERMIT

- I, the appointed operator, hereby declare that the **apparatus** detailed above has been prepared in accordance with the **Operating Regulations for High-voltage Systems**.
- We, the undersigned, mutually agree that the **apparatus** to be worked on has been made dead and is safe to work on.

SPECIAL ENDORSEMENT (If any)

.....
.....

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Permit issued by Appointed Operator – Operating

Signature:..... Date:..... Time:.....

Name (Print).....

PERMIT ACCEPTED BY RESPONSIBLE PERSON / CUSTOMER / CONTRACTOR

Signature:..... Date:..... Time:.....

Name (Print)

CLEARANCE

I, the **Responsible Person/Customer/Contractor**, hereby notify the **Authorised Person** that the work detailed in the above permit has been completed, all workers have been withdrawn, and the **apparatus** is ready to be returned to service.

(Responsible Person / Customer / Contractor)

Signature:..... Print name

Date:..... Time:.....

(Authorised person - Operating)

Signature:..... Print name

Date:..... Time:.....

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Annexure 9 - High Voltage Authorization for Distribution and Transmission (Informative)

	HIGH VOLTAGE AUTHORISATION FOR DISTRIBUTION AND TRANSMISSION	Template Identifier:	
		Document Identifier:	
		Effective Date:	
		Review Date:	

Operating Unit: _____	Area of responsibility: _____
Name: _____	Department/Company: _____
Designation: _____	Unique/ID No: _____
Contact no.: _____	_____

In terms of definition 1.8 of the Operating Regulations for High Voltage Systems you are hereby authorised to perform the duties below:

- 1.70 Responsible person restricted to: (e.g. lines work only, cable work only, etc)_____
- 2.3.4.1 Transmission of messages: _____
- 2.3.5.1 Accept pre-authorized instructions: _____
- 2.3.5.3 Taking permission to operate and work: (if restricted state feeders)_____
- 2.7.1 Checking of phasing:(if applicable state restriction)_____
- 3.1.2 Access to live chambers, restricted- and prohibited areas: (If restricted state which areas / chambers)_____
- 3.2 Supervise work in Live Chambers:_____
- 3.4 Supervise work in Restricted areas:_____
- 4.2.4 Right to possess keys: (State category/type of key)_____

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- 5.1 Perform switching operations: (State voltage range and/or specific feeders) _____
- 5.1 Perform linking operations: (State voltage range and/or specific feeders) _____
- 5.1 Perform safety testing operations: (State voltage range and/or specific feeders) _____
- 5.1 Perform earthing operations: (State voltage range and/or specific feeders) _____
- 5.1 Supervise people to Perform Switching/Linking/Safety Testing/Earthing operations:(State voltage range and/or specific feeders) _____
- 5.3.6.1 Take handover: (If restricted state apparatus) _____
- 5.3.6.3 Supervise work in close proximity to live conductors or apparatus: _____
- 5.5.2 Replace Drop out fuse Isolator: (If restricted state feeders/substations/voltages) _____
- 5.6 Supervise persons working: (Conduct supervision in accordance with 240-86640998) _____
- 5.9.2 Testing of equipment: (If restricted state which tests and/or apparatus and/or voltage) _____
- 5.10 Permission to Sectionalise: (If restricted state which tests and/or apparatus and/or voltage) _____
- 6.4 Restoration of supply: (If restricted state feeders/substations/voltages) _____
- 6.5 Establish a temporary local control: (If restricted state feeders/substations/voltages) _____
- 8.2.3.1 Issue of work permits: (If restricted state voltages and/or nature of work) _____
- 8.2.7 Supervise work without a work permit: (If restricted state voltages and/or nature of work) _____

OTHER:

Recommended by Assessor:

Signature:

Date:

Supported by Line Manager/ Senior Supervisor:

Signature:

Date:

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**Authorised by
Designated/Delegated
person:** _____

Signature: _____

Date: _____

Expiry Date:/...../.....

**THE AUTHORISATION DETAILED ABOVE IS UNDERSTOOD BY ME AND I ACCEPT THE
DUTIES AND RESPONSIBILITIES SET OUT THEREIN. CONTRACTORS ACCEPT
RESPONSIBILITIES ON OWN RISK.**

**Authorised
Person:** _____

(Print Name)

Signature: _____

Date: _____

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ANNEXURE 10– HIGH VOLTAGE AUTHORISATION FOR DISTRIBUTION / TRANSMISSION LIVE WORK

AREA: SECTION:

NAME: UNIQUE N°:

DESIGNATION:

In terms of the operating regulations for high-voltage systems you are hereby authorised to perform the duties as defined below:

1. You are hereby appointed in the area as an: AUTHORISED PERSON for the following duties:
 - A TO BE IN CHARGE OF LIVE WORK IN TERMS OF REGULATION 7.1.1
 1. * Gloving method limited to attached procedures
 2. * Stick method limited to attached procedures
 3. * Barehand method limited to attached procedures
 4. * Aerial method limited to attached procedures
 - B TO PERFORM LIVE WORK IN TERMS OF REGULATION 7.1.2
 1. * Gloving method limited to attached procedures
 2. * Stick method limited to attached procedures
 3. * Barehand method limited to attached procedures

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4. * Aerial method limited to attached procedures

2. You are issued with **OPERATING** REGULATION BOOK NO:

3. In terms of Regulation 4.2.4 you are issued with the following keys to carry out the above duties:

--	--	--	--	--	--	--

NOTE: This authorisation supersedes all previous authorisations.

- * All items not applicable must be deleted.
- * Authorisations are valid for three years.

RECOMMENDED:

AUTHORISED

SIGNATURE.....PRINT....

SIGNATURE.....PRINT.....

DATE:/...../.....

DATE:/...../.....

EXPIRY DATE:/...../.....

I UNDERSTAND THE AUTHORISATION DETAILED ABOVE AND I ACCEPT THE DUTIES AND RESPONSIBILITIES SET OUT THEREIN.



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SIGNATUREPRINT.....

DATE:/...../.....

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ANNEXURE 13 – DECLARATION FORM FOR NON ELECTRICAL ACTIVITIES

DECLARATION BY AUTHORISED PERSON IN CHARGE OF NON-ELECTRICAL ACTIVITIES

I, the undersigned authorised person in charge of non-electrical activities confirm that:
 In terms of Regulation 9.2.3 all auto-reclosing features of the **breaker(s) controlling the supply to:**

.....
 have been made inoperative, **warning notices** *have / have not been affixed to the **control panels of the breaker(s)** concerned, and the **line** is handed over to me for **non-electrical activities**, and that:

the nominal system voltage is

the **safety clearance** is

the **non-electrical activities** to be done are

.....
 Date Time Auth Person Print Name.....

DECLARATION BY PERSONS AUTHORISED TO PERFORM NON-ELECTRICAL ACTIVITIES

We, the undersigned persons authorised to perform non-electrical activities, confirm that the line to be worked on is as stated above and that we understand the details and restrictions of the activities to be carried out.

Date Time Auth. person Print name.....

Date Time Auth. person Print name.....

Date Time Auth. person Print name.....

Date Time Auth. person Print name.....

Date Time Auth. person Print name.....

CLEARANCE BY AUTHORISED PERSON IN CHARGE OF NON-ELECTRICAL ACTIVITIES

Non-electrical activities on the above-mentioned line have been completed.
 The persons authorised to perform non-electrical activities have been withdrawn from the line and the line is handed back to the control officer.

Date Time Auth. person.....Print name

* Delete whichever is not applicable.

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ANNEXURE 14 – EARTH LABEL

STATION.....

PANEL.....

PERMIT NO. (IF ANY).....

EARTHING GEAR IN USE

No.	TYPE	POSITION	TIME	DATE

SIGNATURE.....PRINT.....

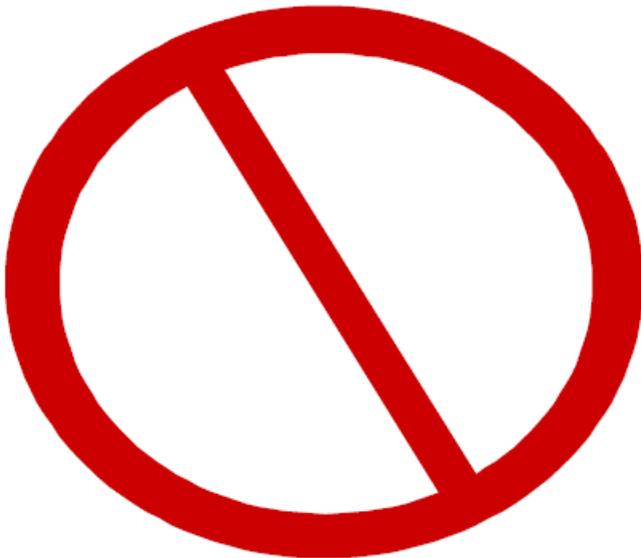
AUTHORISED PERSON

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ANNEXURE 15 – PROHIBITORY SIGN (MANDATORY)

RED ONTO WHITE BACKGROUND

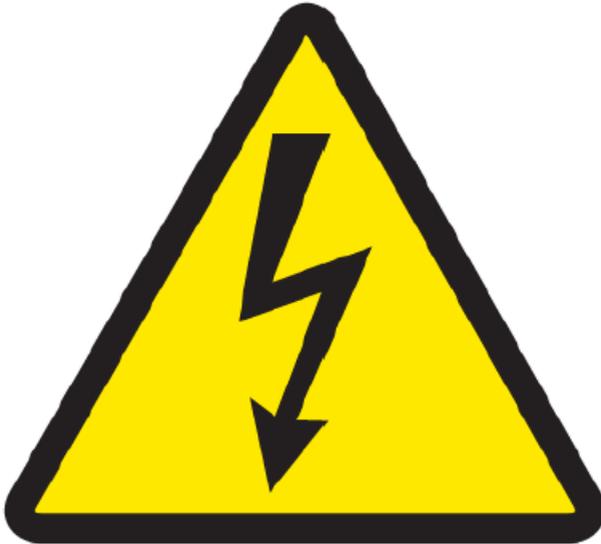


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ANNEXURE 16 – WARNING SIGN (MANDATORY)

BLACK ONTO YELLOW BACKGROUND



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ANNEXURE 17– STANDARD ABBREVIATIONS

Only the following abbreviations may be used as instructions written on the controller/ operator's instruction form:

Abbreviation	Description
A/B Sw	Air break switch
ARC	Auto Re-close
Aux.	Auxiliary
BEY→	Beyond and Excluding N/O link
B Ø	Blue Phase
B/B	Busbar
B/Cpl	Bus Coupler
Bkr	Breaker
BJ	Broken Jumpers
B/Sect	Bus Section
CX Bank	Capacitor Bank
C/O	Chop over or Change over
CI	Close
CMS	Control mode switch
CT	Current Transformer
CTVT	Current Transformer Voltage Transformer
DCB	Disconnect Circuit Breaker
E/F	Earth Fault
E/Sw	Earth Switch
Fdr	Feeder
H/B	Hand back
H/O	Hand over
Isol	Isolator
Iso	Isolating
I/C	In commission

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Abbreviation	Description
I/Ctrl	Intercontrol Handout
kV	Kilovolt
L/W	Live Work
Neut	Neutral
NEC	Neutral Earthing Compensator
NETW	Network
No	Number
NECR	Neutral Earthing Compensator and Resistor
NECRT	Neutral Earthing Compensator Resistor and Auxiliary Transformer
NECR	Neutral Earthing Compensator and Resistor
NECRT	Neutral Earthing Compensator Resistor and Auxiliary Transformer
OOO	Out of commission
Op	Open
OLTC	On Load Tap Changer
PTO&W	Permission to operate and work
PTS	Permission to Sectionalise
R Ø	Red Phase
Reg	Regulation (as a prefix to a regulation reference)
R/E	Removal Of Earths
Rec	Recloser
RX	Reactor
S/T	Safety Test
SF	Section Fuse
SE/F	Sensitive earth fault
Sup	Supervisory
SVC	Static Var Compensator
Sw	Switch
SWER	Single Wire Earth Return
Trfr	Transformer
Tri Sw	Tri Switch
VR	Voltage Regulator



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Abbreviation	Description
WØ	White Phase

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ANNEXURE 18 – AMENDMENT CONTROL SHEET

Changes for 2002

1	Book	Tidy up grammar
2	1.30	New definition (Equipotential zone)
3	1.33	New definition (Ground or floor level)
4	1.74	Changed wording.
5	2.04	Changed wording first 2 paragraphs
6	2.05	Changed wording
7	2.06	Changed wording
8	2.07.1	Changed wording 1st and 3rd paragraphs
9	2.07.2	Changed lay out.
10	3.03	Changed lay out.
11	4.01.5	Changed lay out.
12	4.02.2	Changed wording.
13	4.04.1	Changed wording.
14	5.01	Changed wording.
15	5.03.2	Changed wording.
16	5.03.4.2	Changed wording.
17	5.03.5.1	Changed wording 3rd and 4th paragraphs
18	5.03.5.2.1	Changed wording 1st paragraph
19	5.03.5.2.3	Total new regulation
20	5.03.6.3	Changed wording 2nd paragraph
21	5.04.1	Changed wording 2nd paragraph
22	5.04.4	Changed wording.
23	5.05.4	New regulation
24	5.06	Changed wording.
25	5.09	Changed wording 1st and 3rd paragraphs
26	6.05	Changed layout and wording
27	7.02.3	Changed layout and wording
28	7.02.5	Changed wording.
29	7.02.7	Changed wording.
30	7.03	Changed wording.

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31	8.01.3.1	Changed layout and wording
32	8.01.3.2	Changed layout and wording
33	8.01.3.4	Changed wording.
34	8.01.3.5	Changed wording.
35	8.01.10	Changed layout
36	8.02.3.1	Changed wording.
37	8.02.3.4	Changed wording.
38	8.02.3.5	Changed wording.
39	8.02.9	Changed wording.

Changes for 2005

1	Section 1	Renumbering of the definitions as some was deleted. Replaced “/” with or
2	1.10	Deleted
3	1.11	Changed wording. To accommodate 1.15
4	1.15	Deleted
5	1.46	Deleted
6	1.59	Deleted
7	1.65	Changed wording
8	3.02	Changed wording
9	3.03	Changed wording
10	5.02	Split into two regulations.
11	5.02.1	Generation Regulation
12	5.02.2	New Distribution Regulation
13	5.03.5.2.3	Changed wording
14	5.03.5.2.4	Added sub heading
15	5.03.6.3	Changed total regulation
16	5.04.1	Deleted At power stations in 4 th paragraph
17	5.09	Spilt into two regulations. Leave heading as is.
18	5.09.1	New Generation Regulation
19	5.09.2	Distribution Regulation
20	Section 7	Restructured complete section
21	8.01.10	Changed wording
22	8.02.3.1	Changed wording
23	8.02.3.2	Changed wording

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24	8.02.3.4	Changed wording
25	8.02.9	Added word activity after work
26	Annexures	Deleted 2 nd Annexure in the heading
27	Annexure 6	Deleted 3.02 3.03.3.04.5.02 & 8.02.7
28	Annexure 8	Changed lay out and wording

Changes for revision 32-846 (2010)

1	General Instructions	Changed wording in points 4 & 11
2	Contents	Changed 2.07.2 to 2.08
3		4.01.1 Changed key safe to key cabinet
4		5.03.5.2.4 Moved to new regulation 5.03.6.4
5		Added 8.01.3.6 Transfer of Responsibility
6		Added 8.01.11 Fire on electrical apparatus
7	Annexures	Added annexures 4 (a), (b), (c), (d), (e) & (f)
8	1.02	Added electrostatic precipitator Deleted Electrified fence Deleted on a feeder
9	1.03	Changed an employee or another person to a person
10	1.04	Changed executive to managing
11	1.07	Changed whether an employee or a non-employee to a person
12	1.15	Added a new definition Control Earth
13	1.16	Changed an employee to a person
14	1.19	Added new definition Danger/dangerous
15	1.34	Added new definition Hazard
16	1.38	Added the word “droppers” and changed wording (g) deleted
17	1.40	Added new definition Key cabinet
18	1.54	Added in live chambers, prohibited or restricted areas Deleted on one or more floors in a building or buildings Deleted or throughout a structure
19	1.58	Added a new definition-work checklist
20	1.61	Deleted whether an employee or a non employee
21	1.63	Added new definition Risk assessment

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22	1.65	Changed work clearances to working clearances
23	1.68	Added live
24	1.74	Deleted "other"
25	1.75	Deleted this includes personal earths and bonding/shunt conductors
26	1.76	Deleted last part of definition
27	2.01	Changed responsibility to responsibilities
28	2.02.2	Content reworded
29	2.07.2	Added jumper after dropper. Changed to new heading 2.08 TAKING PLANT OFF THE SYSTEM
30	2.07.3	Becomes 2.07.2
31	2.08	Becomes 2.09
32	2.09	Becomes 2.10
33	4.01.1	Changed heading from key safe to key cabinet
34	4.01.2	Added reference to regulation 5.02.1
35	4.02.1	Deleted breakable transparent window
36	4.02.2	Deleted breakable transparent window
37	5.03.3	Added "and cannot be positively identified" in paragraph 5
38	5.03.4.1	Deleted suitable
39	5.03.4.2	Added new paragraph Earth replaced with control earth
40	5.03.5.1	Added "between point of isolation and first place of work" in paragraph 3. Earth replaced with control earth Added new paragraph 4
41	5.03.5.2.2	Deleted "against induction" in 2 nd paragraph Added paragraph 4
42	5.03.5.2.3	Changed to safe working clearances
43	5.03.5.2.4	Deleted regulation. Becomes regulation 5.03.6.4
44	5.03.6.1	Changed wording from "authorise to allow" in 1 st paragraph. Deleted bonding or shunt conductors Changed reference from 5.03.5.2.4 to 5.03.6.4
45	5.03.6.3	Changed wording in the b) paragraph changed live line or apparatus .
46	5.03.6.4	Safe working clearances moved from 5.03.5.2.4 to 5.03.6.4 and added A.C and D.C voltages to table.

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47	5.06	Changed wording
48	5.09.1.1	Changed complete regulation
49	5.09.1.2	Changed complete regulation
50	7.02.1	Abbreviation (SCADA) replaced with Supervisory Control And Data Acquisition
51	8.01.1	Changed complete regulation
52	8.01.3.2	Changed wording
57	8.01.3.3	Changed complete regulation
58	8.01.3.5	Changed wording and added workers register, risk assessment and pre-work checklist
59	8.01.3.6	New Regulation Transfer of responsibility
60	8.01.4	Changed wording
61	8.01.7	Added second paragraph
62	8.01.9	Re-worded regulation
63	8.01.10	Re-worded regulation
64	8.01.11	New regulation. Fire on electrical apparatus
65	8.02.1	Deleted or any activity
66	8.02.3.1	Changed wording of last paragraph of regulation
67	8.02.3.2	Removed or activity
68	8.02.3.5	Added dangerous
69	8.02.8.1	Reworded
70	8.02.8.2	Changed Possibility of back feed to possible back

Changes for revision 240- 114967625 (2016)

1	General Instruction 4.	Added new requirement
2	General instruction9.	Mandate change.
3	General Instruction11.	Changed date.
4	General Instruction 12	Added new requirement
5	1.3	Added appointed operator to definition.
6	1.4	Mandate change.
7	1.6	New requirement added.
8	1.9	Text changed

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9	1.26	Requirement change
10	1.27	Requirement change
11	1.28a	Capitalisation.
12	1.28b	New requirement
13	1.49	Paper /SCADA system added
14	1.58	Added accountability
15	2.1.2	Added requirements for controllers in training.
16	2.1.5	Added updated corresponding diagram.
17	2.1.8	Added SCADA /mimic to sentence.
18	2.3.3.3	Requirement moved to Regulation 2.4
19	2.7.1	Change accountability
20	3.2	Requirement made exclusive.
21	5.2.1	Change in semantics
22	5.3.1	Change in semantics.
23	5.3.2	Change In semantics.
24	5.3.4.3	New requirement added.
25	5.3.5.1	Paragraph optimised.
26	5.3.6.4	765kv clearance change and note added.
27	5.4.1	Added requirement.
28	5.4.2	Designation change.
29	7.2	Font change.
30	7.2.4	Designation change
31	8.1.1	Change in semantics
32	8.1.3.1	Various change in text
33	8.1.3.6	New requirement change
34	8.2.4	Duration change.
35	Introduction to Annexures	Change status to 13-14
36	Introduction to Annexures	Added annexure 3, 4A and 4B
37		1.76,2.1.2,2.3.1.1,2.3.1.2,2.3.3.2,2.7.2,3.3c,4.1.7.3c,4.1.8.2.4,1.8.3.5,1.5.3.1,5.3.2,5.3.3,5.3.4,2.5.3.4,3.5.3.5,1.5.3.6,1.5.3.6,2.5.3.6,3.5.4,1.5.4.2,5.5.1,5.5.2,5.5.4,5.7,5.9.1,1.5.9.2,6.4,6.5,8.1.1,8.1.2,8.1.3,1.8.1.3,2.8.1.3,3.8.1.3,5.8.1.6,8.1.10,8.1.11,8.2.2,8.2.3,1.8.2.3.3,8.2.3.4,8.2.3.6,8.2.7a,8.2.8.2,8.2.9, change in designation to appointed operator.

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Changes for revision 240- 114967625 (September 2019)

1	General Instruction 6	Add requirement to the text
2	1.56	Add definition for Permission to Operate and Work
3	1.57	Add definition for Permission to Sectionalise
4	1.58-1.80	Change definition numbers
5	2.3.3.1	Remove last instance of paragraph
6	2.3.3.3	PTO&W Instruction added
7	2.3.3.4	PTS Instruction added
8	2.3.3.5	PTO&W and PTS guidance on Operating Instruction form added
9	2.8 a)	Correct capitalisation kV
10	5.3.1	Add operating Requirements for PTO&W and PTS
11	6.4	Add PTS to Abnormal Procedures
13	8.1.3.6	Correct grammar in text
14	Abbreviations	Added SWER

Changes for revision 240- 114967625 (November 2021)

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1	1.2	Add definition for alteration and repairs
2	1.3	Add information to definition of apparatus for generation
3	1.7	Corrected definition authorisation up to 5 years
4	1.14	Add definition to include (DCB)
5	1.23	Add new definition
6	1.24	Add definition for Designated Person
7	1.25	Add definition for Disconnect Circuit Breaker (DCB)
8	1.39	Changed definition for high voltage to include DC
9	1.41	Add definition for HMI
10	1.46	Add DCB technology
11	1.47	New requirement added for DCB
12	1.52	Add definition for medium voltage networks
13	1.53	Add definition for Mix Technology Gas Insulated Switch Gear (MTGIS)
14	1.54	Add new definition for non-electrical activities
15	1.56	Definition new requirement added
16	1.57	Changed wording new requirement added
17	1.67	Changed authorised person to responsible person
18	1.74	Added new definition
19	1.89	Removed responsible person, added authorised person
20	2.1.1	Add safety of apparatus to sentence
21	2.1.2	Add and issue instructions
22	2.1.3.3	Regulation removed
23	2.3.1	New section added for control officers
24	2.3.5.1	Regulation reworded.
25	2.8	Reworded and new additions for DCB
26	5.3.2	New requirement added change to wording
27	5.3.3	Reworded

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28	5.3.5.1	Reworded
29	5.3.5.2	Part of Regulation removed
30	5.3.5.3	Renamed to 5.3.5.2, 5.3.5.2.1 and 5.3.5.2.2
31	5.3.5.2.2	Reworded
32	5.3.6.2	New requirement added
33	5.5.3	Removed by an authorised person
34	5.5.4	No change to regulation
35	5.7	Reworded
36	5.9.2	Reworded
37	6.4	Split the regulation into 6.4.1 and 6.4.2
38	7.2.1	Correct spelling of apparatus
39	7.2.1.1	New requirement added
40	7.2.1.2	Add new section Work in Substations
41	7.2.3.3	Reworded
42	8.1.3.1	Permit added to definition and rewording of regulation
43	8.1.3.4	Reworded
44	9	New section added
45	Annexure 14	Add warning notice label

Authorisation

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