

Statutory Instrument No. 44 of 1974

FACTORIES ACT, 1973
(31 of 1973)

FACTORIES (ELECTRICITY) REGULATIONS, 1974

(Published on the 11th April, 1974)

ARRANGEMENT OF REGULATIONS

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IN EXERCISE of the powers conferred by section 55 (1) of the Factories Act, 1973, the Minister of Health, Labour and Home Affairs hereby makes the following Regulations ~

<p>1. These Regulations may be cited as the Factories (Electricity) Regulations, 1974.</p>	Citation
<p>2. Save as hereinafter provided, these Regulations shall extend and apply to the generation, transformation, conversion, switching, controlling, regulating, distribution and use of electrical energy in any factory and in any premises, place, process, operation or work to which the provisions of Part VII of the Act, with respect to regulations for safety, health and welfare are applied by the Act, or by any order made thereunder.</p>	Application of Regulations
<p>3. In these Regulations, unless the context otherwise requires –</p> <p>“apparatus” means electrical apparatus, and includes all apparatus, machines and fittings in which conductors are used, or of which they form a part;</p> <p>“authorized person” means –</p> <p style="margin-left: 40px;">(a) the occupier; or</p> <p style="margin-left: 40px;">(b) a contractor for the time being under contract to the occupier; or</p> <p style="margin-left: 40px;">(c) a person employed, appointed or selected by the occupier or by a contractor as aforesaid, to carry out certain duties incidental to the generation, transformation, distribution or use of electrical energy,</p> <p style="margin-left: 80px;">such occupier, contractor or person being a person who is competent for the purposes of the regulation in which the term is used;</p> <p>“bare” means not covered with insulating material;</p> <p>“circuit” means an electrical circuit forming a system or branch of a system;</p> <p>“conductor” means an electrical conductor arranged to be electrically connected to a system;</p> <p>“covered with insulating material” means adequately covered with insulating material of such quality and thickness so that there is no danger;</p> <p>“danger” means danger to health or danger to life or limb from shock, burn or other injury to persons employed, or from fire or explosion, attendant upon the generation, transformation, distribution or use of electrical energy;</p> <p>“dead” means at, or about, zero potential, and disconnected from any live system;</p> <p>“earthed” means connected to the general mass of earth in such a manner as will ensure at all times an immediate discharge of electrical energy without danger;</p> <p>“extra high voltage” means a voltage in a system normally exceeding six thousand six hundred volts where the electrical energy is used or supplied;</p> <p>“extra low voltage” means a voltage in a system normally not exceeding one hundred and ten volts direct or fifty-five volts alternating where the electrical energy is used;</p> <p>“high voltage” means a voltage in a system normally above six hundred and fifty volts but not exceeding six thousand six hundred volts, where the electrical energy is used or supplied;</p>	Inter-pretation

“insulating boots” means boots) of such size, quality and construction
 “insulating gloves” means) according to the circumstances of the
 gloves) use thereof that a person is thereby
 “insulating screen” means a) adequately protected from danger;
 screen)
 “insulating stand” means a)
 floor, platform, stand or)
 mat)
 “live” means electrically charged;
 “low voltage” means a voltage in a system normally above one hundred
 and ten volts direct or fifty-five volts alternating but not exceeding
 two hundred and fifty volts where the electrical energy is used;
 “medium voltage” means a voltage in a system normally above two
 hundred and fifty volts, but not exceeding six hundred and fifty volts,
 where the electrical energy is used;
 “public supply” means the supply of electrical energy to the premises of
 any person from outside those premises by the Botswana Power
 Corporation or by any person licensed under the Electricity Supply
 Act, 1973, to generate electricity;
 “substation” means any premises or that part of any premises in which
 electrical energy is transformed or converted to or from voltage above
 medium voltage, except for the purpose of working instruments,
 relays or similar auxiliary apparatus, if such premises or part of the
 premises are large enough for a person to enter after the apparatus is
 in position;
 “switchboard” means the collection of switches or fuses, conductors and
 other apparatus in connexion therewith, used for the purpose of
 controlling the current or voltage in any system or part of a system;
 “switchboard passage-way” means any passage-way or compartment
 large enough for a person to enter, and used in connexion with a
 switchboard when live;
 “system” means an electrical system in which all the conductors or ap-
 paratus are electrically connected to a common source of electro-
 motive force;
 “voltage” means the highest effective difference of the electrical potential
 between any two conductors, or between a conductor and earth.

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Exemptions

4. (1) Nothing in regulations 6, 7, 8, 11, 13, 14, 15, 19, 20, 21, 25, 26,
 27, 28, 29, 30, 32, 33, 34 and 36 of these Regulations shall apply to any
 system in which the voltage does not exceed extra low voltage unless on
 account of special circumstances the chief inspector shall give notice to the
 occupier that this exemption does not apply.

(2) Nothing in these Regulations shall apply to any service lines or
 apparatus on the supply side of the consumer's terminals, or to any chamber

containing such service lines or apparatus, where the supply is from a public supply:

Provided always that no live metal is exposed so that it may be touched and adequate precautions are taken to prevent danger.

(3) If the occupier can show to the chief inspector, with regard to any requirement of these Regulations, that the special conditions in his premises are such as adequately to prevent danger, that requirement shall be deemed to be satisfied; and the Minister may, by order published in the Gazette, direct that any class of special conditions defined in the order shall be deemed for the purposes of all or any of the requirements of these Regulations adequately to prevent danger.

(4) Nothing in these Regulations shall apply to any process or apparatus used exclusively for electro-chemical or electro-thermal or testing or research purposes, provided that such process is so worked and such apparatus is so constructed and protected and such special precautions are taken as may be necessary to prevent danger.

5. All apparatus and conductors shall be sufficient in size and power for the work they are called upon to do, and be so constructed, installed, protected, worked and maintained as to prevent danger as far as is practicable. Safety of installations

6. All conductors shall either be covered with insulating material and further efficiently protected where necessary to prevent danger, or they shall be so placed and safeguarded as to prevent danger as far as is practicable. Conductors

7. Every switch, switchfuse, circuit breaker and isolating link shall be – Control gear
(a) so constructed, placed or protected as to prevent danger;
(b) so constructed and adjusted as accurately to make and to maintain good contact;
(c) provided with an efficient handle or other means of working, insulated from the system, and so arranged that the hand cannot inadvertently touch live metal; and
(d) so constructed or arranged that it cannot accidentally fall or move into contact when left out of contact.

8. (1) Every switch intended to be used for breaking shall be so constructed that it cannot, with proper care, be left in partial contact; this applies to each pole or double-pole or multi-pole switches or circuit-breakers. Switches and circuit-breakers

(2) Every switch intended to be used for breaking a circuit and every circuit-breaker shall be constructed that an arc cannot accidentally be maintained.

9. (1) Every fuse, and every automatic circuit-breaker used instead thereof, shall be so constructed and arranged as effectively to interrupt the current before it so exceeds the working rate as to involve danger, and shall be of such construction or be so guarded or placed as to prevent danger from overheating, or from arcing or the scattering of hot metal or other substance when it comes into operation. Fuses and automatic circuit-breakers

Joints and connexions	<p>(2) Every fuse shall be either of such construction or so protected by a switch that the fusible metal may be renewed without danger.</p>
Provisions of means for cutting off voltage	<p>10. Every electrical joint and connexion shall be of proper construction as regards conductivity, insulation, mechanical strength and protection.</p>
Protection from excess current	<p>11. Efficient means, suitably located, shall be provided for cutting off all voltage from every part of a system, as may be necessary to prevent danger.</p>
Placing of single pole switches	<p>12. Efficient means, suitably located, shall be provided for protecting from excess current every part of a system as may be necessary to prevent danger.</p>
Earthing of bare neutral conductors	<p>13. Where one of the conductors of a system is connected to earth, no single pole switch, other than a link for testing purposes or a switch for use in controlling a generator, shall be placed in such conductor or any branch thereof. A switch or automatic or other cut-out may, however, be placed in the connexion between the conductor and earth at the generating station, for use in testing and emergencies only.</p>
Means of cutting off voltage from motors, etc.	<p>14. Where one of the main conductors of a system is bare and uninsulated, such as a bare return of a concentric system, no switch, fuse or circuit-breaker shall be placed in that conductor, or in any conductor connected thereto, and the said conductor shall be earthed. Nevertheless, switches, fuses and circuit-breakers may be used to break the connexion with the generator or transformers supplying the power, provided that in the case of a bare conductor the connexion of that conductor with earth is not thereby broken.</p>
Switches for control of electric motors	<p>15. Every motor, converter and transformer shall be protected by efficient means suitably placed, and so connected that all voltage may thereby be cut off from the motor, converter or transformer, as the case may be, and from all apparatus in connexion therewith:</p> <p>Provided, however, that where one point of the system is connected to earth there shall be no obligation to disconnect on that side of the system which is connected to earth.</p>
Portable apparatus	<p>16. (1) Every electrical motor shall be controlled by an efficient switch or switches for starting and stopping so placed as to be easily worked by the person in charge of the motor.</p> <p>(2) In every place in which machines are being driven by any electrical motor there shall be means at hand for either switching off the motor or stopping the machines if necessary to prevent danger.</p>
	<p>17. (1) Every flexible wire for portable apparatus shall be connected to the system either by efficient permanent joints or connexions or by a properly constructed connector.</p> <p>(2) In all cases where the person handling portable apparatus or pendant lamps with switches would be liable to get a shock through a conducting floor or conducting work or otherwise if the metal-work of the portable</p>

apparatus became charged, the metal-work must be efficiently earthed; and any flexible metallic covering of the conductors shall be itself efficiently earthed and shall not itself be the only earth connexion for the metal of the apparatus and a lampholder shall not be in metallic connexion with the guard or other metal-work of a portable lamp.

(3) Any portable apparatus and its flexible wire shall be controlled by an efficient means suitably located and capable of cutting off the supply, and where the voltage exceeds low voltage the metal-work shall be efficiently earthed independently of any flexible metallic cover of the conductors and any such flexible cover shall itself be independently earthed.

(4) No portable hand lamp and no portable hand tool shall be used unless the lamp or tool and every part of its flexible wire is working at a voltage normally not exceeding one hundred and ten volts and the maximum voltage between any conductor of the lamp or tool or flexible wire and earth does not normally exceed one hundred and ten volts direct current or fifty-five volts alternating current.

(5) The chief inspector may, by certificate, exempt from any of the provisions of paragraph (2) any class or type or description of portable hand lamp or portable hand tool to which he is satisfied that the application of such provision would be inappropriate or unnecessary; any such exemption may be unqualified or may be subject to such conditions as may be contained in the certificate.

18. The general arrangement of switchboards shall, so far as is practicable, be such that –

General
arrangement
of
switchboards

- (a) all parts that may have to be adjusted or handled are readily accessible;
- (b) the course of every conductor may where necessary be readily traced;
- (c) conductors not arranged for connexion to the same system are kept apart, and can, where necessary, be readily distinguished;
- (d) all bare conductors are so placed or protected as to prevent danger from accidental short circuit.

19. (1) Every switchboard having bare conductors normally so exposed that they may be touched, shall, if not located in an area or areas set apart for the purpose, where necessary be securely fenced or enclosed.

Switchboards
having
exposed bare
conductors

(2) No person except an authorized person, or a person acting under his immediate supervision, shall have access to any part of an area so set apart.

20. All apparatus appertaining to a switchboard and requiring handling, shall so far as is practicable be so placed or arranged as to be operated from the working platform of a switchboard, and all measuring instruments and indicators connected therewith shall, so far as is practicable, be so placed as to be observed from the working platform; if such apparatus be worked or observed from any other place, adequate precautions shall be taken to prevent danger.

Placing of
switchboard
apparatus, etc

Switchboard
working
platforms
and
passage-ways

21. (1) At the working platform of every switchboard and in every switchboard passage-way, if there be bare conductors exposed or arranged to be exposed when live so that they may be touched, there shall be a clear and unobstructed passage of ample width and height, with a firm and even floor, and adequate means of access free from danger shall be provided for every switchboard passage-way.

(2) The following provisions shall apply to all such switchboard working platforms and passage-ways –

- (a) those constructed for low voltage and medium voltage switchboards shall have a clear height of not less than two and a half metres and a clear width measured from bare conductor of not less than one metre unless the bare conductors, whether overhead or at the sides of the passage-way, are otherwise adequately protected from danger by divisions or screens or other suitable means;
- (b) those constructed for high voltage and extra high voltage switchboards, other than operating desks or panels working solely at low voltage, shall have a clear height of not less than three metres and all conductors shall be so screened or guarded that they cannot be touched accidentally and the passage-way shall have a clear width of not less than one metre measured from such screening or guarding; and
- (c) bare conductors shall not be exposed on both sides of the passage-way unless –
 - (i) in the case of conductors on either side being at high voltage or extra high voltage, the conductors on both sides are so screened or guarded that they cannot be touched accidentally; and
 - (ii) the clear width of the passage is, in the case of low voltage, not less than two metres between bare conductors, and, in the case of high voltage and extra high voltage, not less than three metres measured between the screening or guarding.

Switchboards
for high
voltage and
extra high
voltage

22. In every switchboard for high voltage or extra high voltage –

- (a) every high voltage and extra high voltage conductor within reach from the working platform or in any switchboard passage-way shall be so placed or protected as adequately to prevent danger;
- (b) the metal cases of all instruments working at high voltage or extra high voltage shall either be earthed or completely enclosed with insulating covers;
- (c) all metal handles of high voltage or extra high voltage switches, and, where necessary to prevent danger, all metal gear for working the switches, shall be earthed; and
- (d) when any work is done on any switchboard for high voltage or extra high voltage the switchboard shall be made dead unless –
 - (i) the section of the switchboard on which the work is done (hereinafter referred to as “the relevant section”) and every other section which is live is either –

- (aa) so separated from the relevant section by permanent or removable divisions or screens as not to be a source of danger to persons working on the relevant section; or
- (bb) in such a position or of such construction as to be as safe as if so separated as aforesaid; or
- (ii) the switchboard itself is so arranged as to secure that the work is done without danger without taking any of the precautions aforesaid.

23. All parts of generators, motors, transformers or other similar apparatus, at high voltage or extra high voltage, which are within reach from any position where a person employed may require to be, shall so far as is practicable be so protected as to prevent danger.

Protection of high voltage and extra high voltage apparatus

24. Where a high voltage or extra high voltage supply is transformed for use at a lower voltage, or energy is transformed up to above low voltage, suitable provision shall be made to guard against danger by reason of the lower voltage system becoming accidentally charged above its normal voltage by leakage or contact from the higher voltage system.

Precautions against accidental charging above normal working voltage

25. Where necessary to prevent danger, adequate precaution shall be taken either by earthing or by other suitable means to prevent any metal other than the conductor from becoming electrically charged.

Precautions against accidental charging of metal

26. Adequate precautions shall be taken to prevent any conductor or apparatus from being accidentally or inadvertently electrically charged when persons are working thereon.

Precautions against accidental charging of apparatus

27. Where necessary to prevent danger, insulating stands or screens shall be provided and kept permanently in position, and shall be maintained in sound condition.

Provision of insulating stands or screens

28. Portable insulating stands, screens, boots, gloves or other suitable means shall be provided and used when necessary to prevent danger, and shall be periodically examined by an authorized person.

Provision and use of portable insulating devices

29. Adequate working space and means of access, free from danger, shall be provided for all apparatus that has to be worked or attended to by any person.

Safe working space and means of access

30. All those parts of premises in which apparatus is placed shall be adequately lighted to prevent danger.

Lighting

31. All conductors and apparatus exposed to the weather, wet, corrosion, inflammable surroundings or explosive atmosphere, or used in any process or for any special purpose other than that for lighting or power, shall be so constructed or protected, and such special precautions shall be taken as may be necessary to prevent danger in view of such exposure or use.

Protection against exposure

Only authorized and competent persons to undertake certain work

32. (1) No person except an authorized person or a competent person acting under his immediate supervision shall undertake any work where technical knowledge or experience is required in order to avoid danger and no person shall work alone in any case in which the chief inspector directs that he shall not. No person except an authorized person, or a competent person over the apparent age of twenty-one years acting under his immediate supervision shall undertake any repair, alteration, extension, cleaning or such work where technical knowledge or experience is required in order to avoid danger, and no one shall do such work unaccompanied.

(2) Where a contractor is employed, and the danger to be avoided is under his control, the contractor shall appoint the authorized person, but if the danger to be avoided is under the control of the occupier, the occupier shall appoint the authorized person.

Instructions as to treatment for electric shock

33. Instructions on Form LDF 47, obtainable from the chief inspector, as to the treatment of persons suffering from electric shock shall be affixed in all premises where electrical energy is generated, transformed or used above low voltage; and in such premises or classes of premises in which electrical energy is generated, transformed or used at or below low voltage as the chief inspector may direct; occupiers and contractors shall ensure that authorized or competent persons employed by them are conversant with these instructions.

Construction, etc. of substations

34. Every substation shall be substantially constructed and shall be so arranged that no person other than an authorized person can obtain access thereto otherwise than by the proper entrance, or can interfere with the apparatus or conductors therein from the outside; and shall be provided with efficient means of ventilation and, except in the cases of open air substations, be kept dry.

Control of substations

35. Every substation shall be under the control of an authorized person, and no one but an authorized person or a person acting under his immediate supervision shall enter any part thereof where there may be danger.

Means of access to substations

36. Every underground substation not otherwise easily and safely accessible shall be provided with adequate means of access by door or trapdoor, with a staircase or ladder securely fixed and so placed that no live part of any switchboard or any bare conductor shall be within reach of a person thereon:

Provided, however, that if—

(a) any person is regularly employed therein, otherwise than for inspection or cleaning; or

(b) the substation is not of ample dimensions and there is therein moving machinery other than ventilating fans or extra high pressure,

the means of access to such substation shall be by a doorway and staircase.

Posting and distribution of regulations

37. A printed copy of these Regulations shall be kept posted in every place in which they are applied, in such a position as to be conveniently read by persons employed. A printed copy of these Regulations shall be given by each occupier or contractor to each authorized person or competent person employed by him.

MADE this sixth day of March, 1974.

M.T.M. KGOPO,
Permanent Secretary,

Ministry of Health, Labour and Home Affairs.