



## **STATUTORY RULES AND ORDERS**

## **ELECTRICAL WIRING REGULATIONS**

**APRIL 2023**

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Liberia Electricity Regulatory Commission  
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IN EXERCISE of the powers conferred by Chapter 3 Section 3.3: A. (4), (5), (6), & (8) of the 2015 Electricity Law of Liberia, the Liberia Electricity Regulatory Commission makes the following Regulations this 12<sup>th</sup> day of April 2023.

## **ELECTRICAL WIRING REGULATIONS**

LERC - REG. – 005  
2023

### **PART I - PRELIMINARY PROVISIONS**

#### **1. Citation**

- (1) These Regulations may be cited as the Electrical Wiring Regulations, 2023.
- (2) These Regulations come into force on the 12<sup>th</sup> day of April 2023.

#### **2. Purpose, Applicability and Severability**

- (1) The purpose of these Regulations are to:
  - (a) establish the requirements, procedures and practices for the enforcement of minimum standards for distribution of electrical energy in and around all types of structures including residential and commercial premises, public buildings, factories, construction sites, farmhouses, booths, temporary installations and playgrounds; and
  - (b) ensure the safety of persons, livestock and property from hazards that arise from the use of electricity, including safety against electric shocks, burns and fire.
- (2) These Regulations apply to:
  - (a) low voltage electrical installations in buildings including residential, commercial and public premises, factories and industrial undertakings in which the declared voltages do not normally exceed 1kV AC or 1.5kV DC between conductors and 600V AC or 900V DC between conductors and earth and in accordance with the LS IEC 60364 (All parts);
  - (b) high voltage fixed electrical installations in buildings including residential, commercial and public premises, factories and industrial undertakings in which the declared voltages exceed 1kV AC or 1.5kV ripple-free DC and in accordance with the LS IEC 61936-1; and
  - (c) electrical installations supplied from an external source or from a private generation plant.

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(3) These Regulations do not apply to:

- (a) circuits for telecommunication, radio, telephone, bell and call, sound distribution, fire alarms and emergency lighting, and equipment which are supplied with electricity from a safety source (and not fed directly from a public or private power distribution source);
- (b) internal wiring of manufactured apparatus which is not wired on site;
- (c) electrical equipment of motor vehicles (caravans excluded);
- (d) fixed electrical installations in mobile units such as aircrafts and sea-going vessels; and
- (e) electrical installations at mines and quarries.

(4) If any provision in these Regulations shall for any reason be held invalid or unenforceable, the other provisions not affected thereby shall remain in full force and effect.

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### 3. Definitions

Unless the context otherwise requires, the terms used in these Regulations shall have the following meaning:

<b>AC</b>	Means alternating current
<b>Accessories</b>	Means devices, other than current-using equipment, associated with such equipment or with the wiring of an installation such as switch, lamp holder, socket, plug-top, ceiling rose, fuse cut-out etc.
<b>Ambient temperature</b>	Means the temperature of the air or other medium where the equipment is to be used
<b>Appliance</b>	Means an item of current-using equipment other than a luminaire or an independent motor
<b>Approved loading</b>	Means the maximum current demand approved by a service provider in respect of a fixed electrical installation
<b>Artisan</b>	Means a person who has trained and successfully completed an apprenticeship program of not less than 3 years and has undergone an evaluation by a master electrician
<b>Bonding conductor</b>	Means a protective conductor providing equipotential bonding
<b>Breaking capacity</b>	Means the value of current at which a switch, a switch-disconnector, a circuit-breaker or a fuse is capable of breaking a circuit at a voltage and under conditions of use and behavior specified by its manufacturer
<b>Cable</b>	Means a current carrying conductor
<b>Circuit</b>	Means an assembly of electrical equipment supplied from the same origin and protected against overcurrent by the same protective device(s)
<b>Circuit-breaker</b>	Means a device capable of making, carrying and breaking normal load currents and also making and automatically breaking, under pre-determined conditions, abnormal currents such as short-circuit currents. It is usually required to operate infrequently although some types are suitable for frequent operation
<b>Circuit protective conductor (cpc)</b>	Means a protective conductor connecting exposed-conductive-parts of equipment to the main earthing terminal
<b>Conductor</b>	Means a wire, cable or other form of metal used for conveying electric current from one piece of electrical equipment to another or to earth or any material allowing electrical charges to flow easily
<b>Current-carrying capacity (of a conductor)</b>	Means the maximum current which can be carried by a conductor under specified conditions without its steady state temperature exceeding a specified value

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<b>Current-using equipment</b>	Means equipment which converts electrical energy into another form of energy, such as light, heat or motive power
<b>Danger</b>	Means risk of injury to persons (and livestock where expected to be present) from: (i) fire, electric shock and burns arising from the use of electrical energy, and (ii) mechanical movement of electrically controlled equipment, in so far as such danger is intended to be prevented by electrical emergency switching or by electrical switching for mechanical maintenance of non-electrical parts of such equipment
<b>DC</b>	Means direct current
<b>Direct contact</b>	Means contact of persons or livestock with live parts
<b>Distribution board</b>	Means an assembly containing switching or protective devices (e.g. fuses, circuit-breakers, residual current operated devices) associated with one or more outgoing circuits fed from one or more incoming circuits, together with terminals for the neutral and protective circuit conductors. It may also include signaling and other control devices such as means of isolation
<b>Earth</b>	Means the conductive mass of the Earth, whose electric potential at any point is conventionally taken as zero
<b>Earth electrode</b>	Means a conductor or group of conductors in intimate contact with, and providing an electrical connection to, Earth
<b>Earth fault current</b>	Means a fault current which flows to Earth
<b>Earth leakage current</b>	Means leakage current that is flowing to earth (see also <i>Protective conductor current</i> ).
<b>Earthed equipotential zone</b>	Means a zone within which exposed-conductive-parts and extraneous-conductive-parts are maintained at substantially the same potential by bonding, such that, under fault conditions, the differences in potential between simultaneously accessible exposed- and extraneous-conductive-parts will not cause electric shock
<b>Earthing</b>	Means connection of the exposed-conductive-parts of an installation to the main earthing terminal of that installation
<b>Earthing conductor</b>	Means a protective conductor connecting the main earthing terminal of an installation to an earth electrode or to other means of earthing
<b>Electric shock</b>	Means a dangerous physiological effect resulting from the passing of an electric current through a human body or livestock OR The current forced through the nervous system of the body by external voltage

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<b>Electrical contractor</b>	Means a person duly licensed to undertake electrical works or energy efficiency contracting as a firm through electrical professional(s)
<b>Electrical equipment</b>	Means any item for such purposes as generation, conversion, transmission, distribution or utilization of electrical energy, such as machines, transformers, apparatus, measuring instruments, protective devices, wiring systems, accessories, appliances and luminaires
<b>Electrical installation</b>	Means an assembly of associated electrical equipment supplied from a common origin to fulfil a specific purpose and having certain coordinated characteristics
<b>Electrical work</b>	Means all work and services associated with electrical wiring, solar PV installation (including solar plug and play systems), and energy efficiency
<b>Electrical works</b>	Means specific electrical work and services within an electrical system relating to the installation and maintenance of equipment and facilities for the production and delivery of electricity to end users including, wiring both internal and external OR work in relation to the installation, commissioning, inspection, testing, maintenance, modification or repair of a low voltage or high voltage fixed electrical installation, RE installation, energy efficiency audits, and includes the supervision and certification of that work and the certification of design of that installation
<b>Electrical professional</b>	Means – (a) an electrician certified by LERC to perform electrical wiring works; or (b) an electrical works inspector; (c) a solar PV installer that is certified by an accredited institution and licensed by LERC to install solar PV systems; or (d) an energy auditor duly licensed by LERC to perform energy audits
<b>Electrician</b>	Means an artisan, technician or engineer trained to perform electrical wiring and installation works
<b>Emergency switching</b>	Means an operation intended to remove, as quickly as possible, danger, which may have occurred unexpectedly
<b>Enclosure</b>	Means a part providing protection of equipment against certain external influences and in any direction protection against direct contact
<b>Energy auditor</b>	Means an engineer certified by an accredited institution to inspect buildings or industrial processes and assess energy use and make recommendations for optimizing efficiency and minimizing costs

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<b>Energy efficiency</b>	Means the process of reducing the amount of energy (electrical or thermal) required to provide products and services with wiring or piping systems
<b>Engineer</b>	Means a person that acquires training in the discipline concerned with the study, design and application of equipment, devices and systems relating to electrical power generation, transmission and distribution of at least High School + 4 years including an electromechanical engineer or equivalent.
<b>Equipment</b>	<i>(see Electrical equipment)</i>
<b>Equipotential bonding</b>	Means electrical connection maintaining various exposed-conductive-parts and extraneous-conductive-parts at substantially the same potential.
<b>Equipotential zone</b>	<i>(see Earthed equipotential zone).</i>
<b>Exposed-conductive-part</b>	Means a conductive part of equipment which can be touched, and which is not a live part, but which may become live under fault conditions
<b>External influence</b>	Means any influence that is external to an electrical installation which affects the design and safe operation of that installation
<b>Extra-low voltage</b>	<i>(see Voltage, nominal).</i>
<b>Extraneous-conductive-part</b>	Means a conductive part liable to introduce a potential, generally earth potential, and not forming <i>(or that does not form)</i> part of the electrical installation
<b>Fault</b>	Means a circuit condition in which current flows through an abnormal or unintended path. <i>[This may result from an insulation failure or a bridging of insulation. Conventionally the impedance between live conductors or between live conductors and exposed- or extraneous-conductive-parts at the fault position is considered negligible]</i>
<b>Fault current</b>	Means a current resulting from occurrence of a fault
<b>Final circuit</b>	Means a circuit connected directly to current-using equipment, or to a socket outlet(s) or other outlet points for the connection of such equipment
<b>Fixed electrical installation</b>	Means equipment or appliance designed to be fastened to a support or otherwise secured in a specific location (Examples include distribution boards, wiring installations and lighting fittings, etc., that are fixed in premises.
<b>Fixed equipment or appliance</b>	(same meaning as – fixed electrical installation)
<b>Flexible cable</b>	Means a cable whose structure and materials make it suitable to be flexed while in service
<b>Fuse</b>	Means a device which by the melting of one or more of its specially designed and proportioned components,

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	opens the circuit in which it is inserted by breaking the current when this exceeds a given value for a sufficient time. The fuse comprises all the parts that form the complete device.
<b>Hazard</b>	Means anything that can cause harm
<b>High voltage</b>	(see <i>Voltage, nominal</i> ).
<b>HV</b>	Means high voltage
<b>IEC</b>	Means International Electrotechnical Commission
<b>Inspector</b>	Means an electrician that has been duly certified by LERC to inspect and test electrical wiring and installation works including solar PV systems.
<b>Installation</b>	(see <i>Electrical installation</i> )
<b>Insulation</b>	Means suitable non-conductive material enclosing, surrounding or supporting a conductor
<b>Isolation</b>	Means a function intended to cut off for reasons of safety the supply from all, or a discrete section, of the installation by separating the installation or section from every source of electrical energy
<b>Isolator (also known as disconnecter)</b>	Means a mechanical switching device which, in the open position, complies with the requirements specified for isolation. An isolator is otherwise known as a disconnecter
<b>kV</b>	Means kilovolts
<b>Leakage current</b>	Means electric current in an unwanted conductive path under normal operating conditions
<b>LERC</b>	Means Liberia Electricity Regulatory Commission
<b>LEWC</b>	Means Liberia Electrical Wiring Code
<b>Linked circuit-breaker</b>	Means a circuit-breaker the contacts of which are so arranged as to make or break all poles simultaneously or in a definite sequence
<b>Linked isolator</b>	Means an isolator the contacts of which are so arranged as to make or break all poles simultaneously or in a definite sequence
<b>Linked switch</b>	Means a switch the contacts of which are so arranged as to make or break all poles simultaneously or in a definite sequence
<b>Live part</b>	Means a conductor or conductive part intended to be energized in normal use, including a neutral conductor but, by convention, not a PEN conductor
<b>Low voltage</b>	(see <i>Voltage, nominal</i> ).
<b>LS</b>	Means Liberia Standard
<b>LV</b>	Means low voltage
<b>Luminaire</b>	Means equipment which distributes, filters or transforms the light from one or more lamps, and which includes any parts necessary for supporting, fixing and protecting the lamps, but not the lamps themselves,

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	and, where necessary, circuit auxiliaries together with the means for connecting them to the supply. For the purposes of the Regulations a lamp holder, however supported, is deemed to be a luminaire
<b>Main earthing terminal</b>	Means the terminal or bar provided for the connection of protective conductors, including equipotential bonding conductors, and conductors for functional earthing, if any, to the means of earthing
<b>Mechanical maintenance</b>	Means the replacement, refurbishment or cleaning of lamps and non-electrical parts of equipment, plant and machinery
<b>Neutral conductor</b>	Means a conductor connected to the neutral point of a system and contributing to the transmission of electrical energy. The term also means the equivalent conductor of an IT or DC. system unless otherwise specified in the Regulations and also identifies either the mid-wire of a three-wire DC circuit or the earthed conductor of a two-wire earthed DC circuit
<b>Nominal voltage</b>	<i>(see Voltage, nominal)</i>
<b>Overcurrent</b>	Means current exceeding the rated value. For conductors the rated value is the current-carrying capacity. <i>(or a greater level of current than the materials in use will tolerate for a long period of time)</i>
<b>Overload</b>	Means an overcurrent occurring in a circuit which is electrically sound
<b>PEN</b>	Means protective earth neutral
<b>V</b>	Means Volts
<b>PEN conductor</b>	Means a conductor combining the functions of both protective conductor and neutral conductor
<b>Phase conductor</b>	Means a conductor of an AC system for the transmission of electrical energy other than a neutral conductor, a protective conductor or a PEN conductor. The term also means the equivalent conductor of a DC system unless otherwise specified in the Regulations
<b>Plug</b>	Means a device, provided with contact pins, which is intended to be attached to a flexible cable, and which can be engaged with a socket outlet or with a connector
<b>Point (in wiring)</b>	Means a termination of the fixed wiring intended for the connection of current-using equipment
<b>Portable (equipment or appliance)</b>	Means electrical equipment which is moved while in operation or which can easily be moved from one place to another while connected to the supply
<b>Power system</b>	Means an electrical system consisting of a single source of electrical energy and an installation.

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<b>Protective conductor</b>	Means a conductor used for some measures of protection against electric shock and intended for connecting together any of the following parts: (i) exposed-conductive-parts (ii) extraneous-conductive-parts (iii) the main earthing terminal (iv) earth electrode(s) (v) the earthed point of the source, or an artificial neutral
<b>Protective conductor current</b>	Means electric current which flows in a protective conductor under normal operating conditions
<b>Radial circuit</b>	Means a type of fixed wiring that feeds one piece of suitable cable from one power point to another until it reaches the last point on the circuit and does not return back to the consumer unit or power source.
<b>Risk</b>	Means the chance of being harmed by a hazard
<b>Residual current</b>	Means the algebraic sum of the currents in the live conductors of a circuit at a point in the electrical installation.
<b>Residual current device</b>	Means a mechanical switching device or association of devices intended to cause the opening of the contacts when the residual current attains a given value under specified conditions.
<b>Ring (final) circuit</b>	Means a final circuit arranged in the form of a ring and connected to a single point of supply
<b>Service</b>	Means electricity supplied to a customer by a service provider through distribution and supply network or for stand-alone system facilities operated under a license or permit issued by LERC
<b>Service Provider</b>	Means a legal entity licensed to provide a regulated activity or service
<b>Short-circuit current</b>	Means an overcurrent resulting from a fault of negligible impedance between live conductors having a difference in potential under normal operating conditions
<b>Simultaneously accessible (parts)</b>	Means conductors or conductive parts which can be touched simultaneously by a person or, in locations specifically intended for them, by livestock. Simultaneously accessible parts may be: live parts, exposed-conductive-parts, extraneous-conductive-parts, protective conductors or earth electrodes
<b>Skilled person</b>	Means a person with technical knowledge or sufficient experience to enable him/her to avoid dangers which electricity may create
<b>Socket outlet</b>	Means a device, provided with female contacts, which is intended to be installed with the fixed wiring, and intended to receive a plug.

<b>Spur circuit</b>	Means a branch from a ring final circuit
<b>Substation</b>	Means premises or an enclosed part of premises that contains electrical equipment for transforming or converting energy to or from high voltage (other than transforming or converting energy solely for the operation of switching devices or instruments) or for switching, controlling or regulating energy at high voltage and that are large enough to admit the entrance of a person after the electrical equipment is in position;
<b>Switch</b>	Means a mechanical device capable of making, carrying and breaking current under normal circuit conditions, which may include specified operating overload conditions, and also of carrying for a specified time currents under specified abnormal circuit conditions such as those of short-circuit. It may also be capable of making, but not breaking, short-circuit currents
<b>Switchboard</b>	Means an assembly of switchgear with or without instruments, but the term does not apply to groups of local switches in final circuits
<b>Switchgear</b>	Means an assembly of main and auxiliary switching apparatus for operation, regulation, protection or other control of an electrical installation
<b>Switching</b>	Means making or breaking a current under normal circuit conditions
<b>Switch room</b>	Means premises or an enclosed part of premises that contains electrical equipment for switching, controlling or regulating electricity at low voltage and above and that are large enough to admit the entrance of a person after the electrical equipment is in position
<b>Voltage</b>	Means difference in electrical charge between two points in a circuit, expressed in volts; force available to push current round a circuit
<b>Voltage, nominal</b>	Means voltage by which an installation (or part of an installation) is designated. The following ranges of nominal voltage (rms values for AC) are defined: <ul style="list-style-type: none"> <li>- <b>Extra-low</b> - Normally not exceeding 50 V AC or 120 V ripple-free DC, whether between conductors or to Earth,</li> <li>- <b>Low</b> -Normally exceeding extra-low voltage but not exceeding 1000 V AC or 1500 V DC between conductors, or 600 V AC or 900 V DC between conductors and Earth</li> <li>- <b>High</b> - Exceeding 1kV AC or 1.5kV ripple-free DC and in accordance with the LS IEC 61936-1;</li> </ul>

	The actual voltage of the installation may differ from the nominal value by a quantity within normal tolerances
<b>Wiring system</b>	Means an assembly made up of cable or busbars and parts which secure and, if necessary, enclose the cable or busbars.

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## **PART II – STANDARDS AND REQUIREMENTS FOR ELECTRICAL WIRING**

### **4. Liberia Electrical Wiring Code**

- (1) All electrical wiring installations in the Republic of Liberia shall be in accordance with the Liberia Electrical Wiring Code, 2023 adopted by the electricity industry stakeholders and issued by the LERC.
- (2) The Liberia Electrical Wiring Code (LEWC) consists of the following matters which shall be construed in accordance with the provisions of these Regulations:
  - (a) Introduction;
  - (b) Technical design considerations;
  - (c) General safety requirements and practices;
  - (d) Installation arrangements for control and protection of supply;
  - (e) Isolation and switching requirements;
  - (f) Protective measures for safety;
  - (g) Protective devices and arrangement;
  - (h) Conductors, joints, connections and accessories;
  - (i) Requirements for specific installations and equipment;
  - (j) Renewable energy power system installations;
  - (k) Display of labels and notices; and
  - (l) Inspection, testing and certification.
- (3) A person shall not undertake electrical wiring of installations and premises unless the wiring is carried out in accordance with the requirements specified in the LEWC.

### **5. Technical Design**

- (1) An electrical installation shall be designed by an electrical professional of appropriate grade subject to regulation 20 to provide the protection of persons, livestock and property in accordance with these Regulations and to ensure the proper functioning of the electrical installation for the intended use.
- (2) An electrical layout shall be considered after proper locations of all outlets for lamps, fans, and appliances, both fixed and portable, have been selected and best methods of wiring determined.
- (3) Before commencement of the electrical works, runs of wiring and exact positions of points of switchboxes and other outlets shall be marked on the plans of the building or installation and endorsed by the electrical professional for submission to the appropriate authority as part of the building or installation permit approval process.
- (4) Graphical symbols to be used in all electrical drawings, wiring plans and other technical designs shall be in accordance with LS IEC 60617.

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## **6. General Safety Requirements**

- (1) A fixed electrical installation shall be constructed, installed and protected in accordance with the appropriate design to prevent danger to persons, livestock and damage to property.
- (2) Good workmanship and suitable quality materials shall be used in the construction of the electrical installation.
- (3) A person shall not use a material for electrical wiring unless that material is:
  - (a) capable of maintaining the integrity of an electrical equipment or installation under environmental conditions stipulated by the manufacturer of the material for electrical wiring; and
  - (b) approved by the Liberia Standards Authority.
- (4) An electrical equipment shall be installed so that it is capable of being identified, maintained, inspected and tested, where appropriate, so as to prevent danger.
- (5) Electrical equipment that requires operation, maintenance or attention shall be installed in the manner to provide adequate and safe means of access and working space.
- (6) Suitable lighting giving a minimum illumination level and suitable ventilation or air conditioning that ensure required ambient temperatures shall be provided for installation works and operations of electrical equipment.
- (7) The owner or person in control of a substation or switch room shall ensure that unauthorized entry into a substation or switch room is prevented.
- (8) The owner or person in control of premises in which a switch room or substation is located shall ensure that their entrances and exits are kept clear of obstructions that could prevent easy access to the switch room or substation.
- (9) An electrical professional of appropriate grade shall take charge of electrical works being undertaken to ensure that adequate safety precautions are taken to prevent danger arising from electrical wiring works.

## **7. Isolation and Switching**

- (1) Effective means of switchgear control, readily accessible for operation, shall be provided for a fixed electrical installation to enable it receive electricity from an external source, and to de-energize or disconnect equipment or installation from electricity supply to allow for either work to be done on the installation or clear faults downstream as may be necessary, to prevent or remove danger.
- (2) Where motorized drives are involved with moving parts that are readily accessible and that may cause bodily injury, there shall be an effective means of disconnection locally placed for ready operation so that all voltage may be cut off from the motorized drives.

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## **8. Circuit Arrangement**

- (1) A wiring installation shall be divided into sub-circuits for the purpose of:
  - (a) ensuring avoidance of danger in the event of a fault; and
  - (b) facilitating safe operation, inspection, testing and maintenance.
- (2) A separate circuit shall be provided for each part of a wiring installation that needs to be separately controlled and where a wiring installation comprises more than one final circuit:
  - (a) each final circuit shall be separately protected against overcurrent and connected to a separate isolation device in a distribution board;
  - (b) the wiring of each final circuit shall be electrically separated from that of every other final circuit, to prevent indirect energization of the final circuit intended to be isolated; and
  - (c) each final circuit shall be designed so that it is not affected by the failure of any other final circuit.
- (3) The number of final circuits and number of the points supplied from a ring circuit, radial circuit or spur circuit shall comply with the LEWC.

## **9. Current Demand and Conductor Size**

- (1) A circuit shall be suitable for the maximum current demand of all current-using equipment that is connected or intended to be connected to the circuit when the current-using equipment is functioning in its intended manner.
- (2) A conductor of suitable construction and of sufficient size and current-carrying capacity shall be used for its intended purpose to prevent excessive temperature rise while in use.
- (3) The maximum current demand of a fixed electrical installation shall not exceed the approved loading.
- (4) A live conductor shall be protected against accidental direct contact by a person.

## **10. Overcurrent Protective Devices**

- (1) Subject to regulation 8(2)(a), the overcurrent protective device provided shall be a device that:
  - (a) operates automatically to break the circuit before the safe current rating of the circuit is exceeded;
  - (b) is of adequate breaking capacity;
  - (c) is suitably located; and
  - (d) is properly constructed so as to prevent danger from overheating, arcing or the scattering of hot particles when the device comes into operation and also permit restoration of the supply without danger.

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## **11. Neutral Conductor Protective Devices and Switches**

- (1) A single-pole switch shall be inserted in the phase conductor of a single-phase circuit only.
- (2) No fuse and no circuit-breaker, isolator or switch, other than a linked circuit-breaker, linked isolator or linked switch, shall be inserted in a neutral conductor.
- (3) Despite sub-regulations (1) and (2), a single-pole switch may be inserted between the earthing connection and the neutral terminals of generators running or likely to be running in parallel provided adequate precautions have been taken to avoid danger.
- (4) A solid link may only be inserted in a neutral conductor provided it cannot be disconnected without first disconnecting the related phase conductors or without using a tool.
- (5) A linked circuit-breaker, a linked isolator or a linked switch inserted in a neutral conductor shall be arranged to break simultaneously with the related phase conductors.

## **12. Protection Against Earth Leakage and Earth Fault Currents**

- (1) A circuit shall be provided with effective means to prevent the persistence of earth fault currents and dangerous earth leakage currents.
- (2) Where metalwork of electrical equipment, other than its current-carrying conductors, may become charged with electricity in a manner that would cause danger if the insulation of a conductor becomes defective or if a fault occurs in the equipment, the metalwork shall be earthed in a manner that will cause safe discharge of electricity, or other effective means shall be provided to prevent the occurrence of danger.
- (3) Where metalwork is earthed in accordance with sub-regulation (2), the circuits concerned shall be protected against the persistence of earth fault current by using any of the following devices that will disconnect the faulty circuit in time to avoid danger –
  - (a) an overcurrent protective device in accordance with regulation 8; or
  - (b) a residual current device or
  - (c) an equally effective device.
- (4) Where metalwork of electrical equipment is earthed in accordance with sub-regulation (2) and the metalwork is accessible simultaneously to a substantial extraneous-conductive-part, the extraneous-conductive-part shall be effectively connected to the main earthing terminal of the fixed electrical installation.

## **13. Earthing Arrangements**

- (1) A fixed electrical installation shall have an effective earthing arrangement, including a connection to earth electrodes, for its protection against earth fault currents and dangerous earth leakage currents.
- (2) In addition to the requirement under sub-regulation (1), where the supply is:

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- (a) taken directly from a service provider's transformer within the premises in which the fixed electrical installation is situated, the main earthing terminal of the installation shall be bonded to the service provider's bonding terminal that connects to the earthed point of the transformer; or
  - (b) taken from the service provider's underground cable that has exposed-conductive-parts at the cable termination at the point of supply, the main earthing terminal of the fixed electrical installation shall be bonded to those exposed-conductive-parts.
- (3) Where bonding referred to in sub-regulation (2) is used to prevent the rise of a dangerous earth potential, the fixed electrical installation shall satisfy all the requirements of regulation 12 even if the bonding is disconnected.

#### **14. Cable Supports, Enclosures, Joints and Terminations**

- (1) Cables shall be supported to put them in proper position and to avoid stresses on insulations at some parts of insulators which will thereafter destroy the insulators.
- (2) The support shall be at minimum distance possible to make it properly supported whether barely on wall or within the wiring enclosure.
- (3) An enclosure of a wiring installation shall be properly designed, constructed, installed, protected and maintained so as to prevent danger.
- (4) Good workmanship and suitable materials shall be used for the enclosure of a wiring installation.
- (5) An electrical joint, connection and conductor shall be properly constructed and installed with respect to conductance, insulation, mechanical strength and protection.
- (6) All joints and connections shall be made in an enclosure that meets the requirements of the LEWC and must be accessible for inspection.
- (7) Where joining by soldering is used, it shall be an endeavor to make homogeneous connection of the two points of the conductive wires.
- (8) For a sheathed cable the electrical professional or electrical contractor must ensure continuity of sheath in the joint enclosure.
- (9) Termination of cables to switches and other load points, switchgears, control gears and other termination points shall be tightly screwed to avoid energy loss heat which can lead to destruction of insulation and culminate in fire hazards.
- (10) Special skilled personnel shall be employed for transmission or distribution line joinery to ensure mechanical strength for avoidance of cable breakdown which may cause dangerous effects due to high voltages associated with such lines.

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### **15. Adverse Conditions Installation**

A fixed electrical equipment or installation which is exposed to the weather, corrosive atmosphere or other adverse condition shall be:

- (a) constructed or protected in a manner to prevent danger; and
- (b) protected by a flame proof enclosure of appropriate construction to prevent danger where the conditions include exposure to inflammable surroundings or an explosive environment.

### **16. Overhead Line Installations**

(1) A low voltage overhead line shall be designed, constructed, installed and protected so as to prevent danger.

(2) The height above ground and horizontal clearances of a low and high voltage overhead line and its accessories at any point of the span shall not be less than as specified in Appendix 1 across any place accessible to vehicular, pedestrian or other crossing or passageway.

(3) No overhead line operating at high voltage shall be installed without the approval of the supply authority.

### **17. Alterations and Additions**

(1) A person shall obtain approval in writing from the service provider prior to:

- (a) undertaking a temporary or permanent alteration in respect of an existing electrical wiring installation; or
- (b) mounting an installation of additional fixed electrical equipment which will require an alteration in respect of electrical wiring.

(2) A person responsible for the alteration or installation of additional fixed equipment shall:

- (a) submit to the service provider in writing notice of the commencement and completion in respect of the alteration or additional installation works intended for connection to the electricity distribution network; and
- (b) afford an authorized officer of the service provider the opportunity for inspection and testing of the works for the alteration or additional installation during and on completion of the works.

### **18. Renewable Energy Power System Installations**

(1) The wiring of Renewable Energy Power System (REPS) installations shall be guided by the provisions specified in Code 10 of the LEWC.

(2) Where the REPS installation is connected in parallel with the mains supply from a service provider, special attention shall be paid to ensure that the REPS installation is automatically disconnected from the mains supply when the mains supply trips.

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## **19. Display of Labels and Notices**

- (1) Warning notices and labels shall be displayed on equipment and installations permanently or temporarily, prior to or during and after electrical installation works as may be required and as prescribed in Code 11 and other parts of the LEWC.
- (2) An identification label and an appropriate warning notice including the word "DANGER" shall be displayed in a conspicuous position at every entrance of a substation and switch room.
- (3) A warning notice bearing the words "DO NOT REMOVE" shall be displayed in a conspicuous position at or near the point of connection of each earthing conductor to an earth electrode, and at or near each main bonding connection.
- (4) A warning notice bearing the words "CAUTION-EQUIPMENT UNDER REPAIR" or "CAUTION-MEN AT WORK", or bearing both warnings, shall be displayed in a conspicuous position at or near the electrical equipment and at the isolation device associated with the electrical equipment on which work is being carried out.
- (5) A notice bearing the words "This installation must be tested and certified by an Inspector before (\_\_\_date) ..." and shall be displayed in a conspicuous position at or near the main distribution board of a fixed electrical installation referred to in regulation 23.
- (6) A notice shall be displayed at the REPS facility showing the Name and Registration Number of the electrical professional or electrical contractor employed for maintaining the facility in continuous safe work order.
- (7) An identification label and warning notice referred to in sub-regulations (2), (3), (5) and (6) shall be durable and securely fixed in position.
- (8) A warning notice under sub-regulation (4) shall be reasonably durable and shall be placed or affixed so that it cannot be accidentally displaced.



## **PART III – COMPLIANCE REQUIREMENTS**

### **20. Qualified Persons to Undertake Electrical Wiring**

A person shall not undertake electrical wiring of an installation or on premises unless that person is certified or licensed in accordance with (or under) the Certification and Licensing of Electrical Professionals and Contractors Regulations issued by the LERC.

### **21. Connection of Electricity Supply to Premises and Installations**

(1) A Service Provider shall not supply electricity to a fixed electrical installation or premises unless the requirements of these Regulations have been complied with and the electrical wiring or installation has been undertaken by an electrical professional or electrical contractor.

(2) A Service Provider shall disconnect electricity supply to a fixed installation or premises where it is found out that any part of these Regulations has been violated or compromised.

(3) Where the electricity supply to the fixed installation or premises of a person has been disconnected due to a contravention of these Regulations by that person, that person:

(a) may apply to the Service Provider for a reconnection of the electricity supply; and

(b) shall obtain the written approval of the Service Provider for the reconnection only if the defective wiring has been rectified and the installation adjudged to meet all the requirements of these Regulations.

(4) The Service Provider or the authorized representative of the Service Provider may reconnect the electricity supply to the installation or premises.

### **22. Inspection, Testing and Certification**

(1) A fixed electrical wiring installation including any work completed after repair, alteration or addition shall, after completion and before it is energized for use, be inspected, tested and certified by an Inspector to confirm that the requirements of the Regulations have been met.

(2) The Inspector shall:

(a) take precautions during the inspection and test to avoid causing danger to persons, livestock and damage to property including installed equipment;

(b) complete and sign the relevant Electrical Installation Certificate and the Schedule of Inspection and Test Results; and

(c) submit the documents referred to in sub-regulation 2(b) to the person who requested the inspection and test if the inspection and test are satisfactory.

### **23. Periodic Inspection, Testing and Certification**

(1) An owner of a premises with a fixed electrical installation wiring shall ensure that a periodic inspection, test and certification is carried out at the intervals indicated in sub-

regulation (2) taking into consideration the type of installation, its use, maintenance schedule and environmental influences.

(2) Subject to sub-regulations (3) and (4), the periodic inspection and testing shall be carried out in accordance with the following schedule:

- (a) ten years after initial installation and use;
- (b) every three to five years after the 10 years of initial installation and use but before expiration of 30 years; and
- (c) every two years after expiration of 30 years.

(3) Despite sub-regulation (2), the following fixed electrical installations of any approved loading shall be inspected, tested and certified once every 12 months:

- (a) places of public entertainment;
- (b) premises for the manufacturing or storing of dangerous goods such as dangerous goods stores, dangerous goods storage tanks, gas stations, petroleum and diesel filling stations and liquefied petroleum gas stations; and
- (c) high voltage fixed installations such as HV switch rooms and substations under the control of the owners, large plant and machinery.

(4) Despite sub-regulation (2), fixed electrical installations located in the following types of premises shall be inspected, tested and certified once every 5 years:

- (a) factories and industrial undertakings having an approved loading exceeding 100 amperes, single or three phase at nominal LV;
- (b) hotels and guest houses;
- (c) hospitals and maternity homes, old people's homes;
- (d) schools and institutions; and
- (e) childcare centers.

#### **24. Renewal of Electrical Wiring Installation**

- (1) All electrical installations shall be due for renewal after 30 years of use.
- (2) No electrical installation shall remain in service for more than 35 years.
- (3) The relevant requirements under regulations 21 and 22 shall apply to all renewed electrical installations.

#### **25. Keeping Records**

- (1) An electrical professional or electrical contractor shall keep proper records on all electrical works carried out for the lesser of 5 years or the time since registration as an electrical professional or electrical contractor.
- (2) The electrical professional or electrical contractor shall ensure that each copy of the records prepared including the certificates is made available to the owner of the electrical installation upon completion of the works.

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**26. Owner or Occupiers' Responsibility**

(1) An owner or occupier of any premises shall not allow any electrical installation work to be carried out on his or her premises in contravention of the provisions of these Regulations.

(2) Failure to comply with the provision in sub-regulation (1) is an offence punishable in accordance with the provision hereunder set in these Regulations.

**27. Powers of an Inspector**

(1) Pursuant to section 3.3 A (5), (6) of the ELL, an inspector may at any reasonable time enter any premises and inspect and examine any electrical wiring installation on the premises to establish that the electrical wiring installation was undertaken in accordance with these Regulations.

(2) A person who obstructs an inspector from the performance of an official function in respect of sub-regulation (1) commits an offence and is liable on summary conviction to a fine in accordance with regulation 6 of the LERC's Penalties Regulations.

**28. Offences and Penalties**

(1) A person who contravenes any provision of these Regulations commits an offence and is liable on summary conviction to a fine in accordance with regulation 6 of the LERC's Penalties Regulations.

**29. Transitional Provisions**

(1) These Regulations shall come into effect two years from the date of entry into force.

(2) At the end of the transitional period specified in sub-regulation (1), all the provisions in these Regulations and requirements of the LEWC shall come into effect for compliance including the payment of penalties as provided in regulation 28.

**30. Amendment or Repeal of Regulation**

The LERC may amend or repeal the provisions of these Regulations as it deems necessary.

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**COMMON SEAL OF THE**

**LIBERIA ELECTRICITY REGULATORY COMMISSION**

Was affixed pursuant to the ORDER OF THE COMMISSION

On this 12<sup>th</sup> of April 2023

A handwritten signature in black ink, appearing to read 'Lawrence D. Sekajipo', written in a cursive style.

**Dr. Lawrence D. Sekajipo, CPA, CFE, DBA, JSM  
CHAIRMAN  
BOARD OF COMMISSIONERS**

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## APPENDICES

### APPENDIX 1 – CLEARANCES [Regulation 16(2)]

#### Appendix 1a: Overhead Line Clearances

Type of installation for LV or HV	Vertical Clearance from Ground for various crossings (in meters)					
	Main road	Public Street	Private Driveway	Pedestrian Walkway	Railway crossing	Waterways
0.4kV Bare conductor	7.5	5.5	5.0	4.5	7.0	20 (from highest water level)
0.4kV AB conductor	7.5	5.5	5.0	4.0	7.0	
11kV Bare conductor	8.0	6.0	6.0	6.0	7.5	
22/33kVBare conductor	8.0	6.0	6.0	6.0	7.5	

#### Appendix 1b: Horizontal Clearance from Buildings, Roads & Telecom lines

Type of installation for LV or HV	Clearance from Building structure (m)		Clearance from Telecom Line (m)	
	Horizontal clearance	Height Above structure	Parallel lines	Lines crossing
0.4kV Bare conductor	≤2	≥3	2	1.5
0.4kV AB conductor	≤0.5	≥2	0.3	0.3
11kV Bare conductor	>3.0	-	2.0	1.5
22/33kVBare conductor	>3.0	-	2.3	1.8
132kV or 225kV line	>15	-	2.8 [But generally Not Recommended for long distances]	
Line supports & stays	Shall be located at a distance of at least 2 meters from edge of road			

*NB: Refer to Schedule 1 of Liberia Electrical Wiring Code – ref. code 9.12.4*

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