



RC RESIDENCE TECHNICAL SPECIFICATION – ELECTRICAL SYSTEM INSTALLATIONS

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1 SECTION A: PREAMBLE TO STANDARD SPECIFICATIONS

1.1 INTRODUCTION

These Standard Specifications cover the general technical requirements for the equipment, materials, installation, testing, commissioning and maintenance of electrical installations for the United Nations RC House. These requirements shall be read in conjunction with the Documents as specified below.

"Document" shall mean the complete set of contract documents, including the Tender Conditions, Tender Qualifications, the Standard Specification and the Detail Technical Specification, including all drawings and variation orders issued in terms of the contract.

"Contractor" shall mean the person, partnership, company or firm appointed for the supply, installation, testing, commissioning and maintenance of the Electrical Installation. In the case of the Electrical Installation being a sub-contract, nominated in terms of the Main Contract or otherwise, the word "Contractor" shall also mean "Sub-Contractor" in terms of the Sub-Contract Conditions for the specific installation. Where applicable, the Builder or Principal Contractor shall be referred to as "Main Contractor".

1.2 INSTALLATION WORK

The complete installation shall comply with the requirements of this specification. Should any discrepancies or contradictions exist between this specification and the Detail Technical Specification for the specific installation, the latter shall take precedence.

In the event of discrepancies between the drawings, specifications and bill of quantities, the Engineer shall decide whether the work as executed shall be re-measured on-site or whether re-measurement shall be effected from the working drawings only.

The Engineer's office will inspect the installation from time to time during the progress of the work. The discrepancies will be pointed out to the Contractor, and these shall be remedied at the Contractor's expense. Under no circumstances shall these inspections relieve the Contractor of his obligations in terms of the Documents.

The Contractor shall notify the Engineer timeously when the installation reaches critical stages of completion (e.g. before closing cable trenches, before casting concrete, etc.) so that the Engineer may schedule his inspections in the best interest of all parties concerned.

1.3 REGULATIONS

The installation shall be erected and tested following the Acts and Regulations: "Delivery and Installation of Electrical-, Mechanical-, Control Systems, Plant and Materials".

The Contractor shall issue all notices and pay all of the required fees in respect of the installation to the authorities and shall exempt the Project from all losses, claims, costs or expenditures which may arise as a result of the Contractor's negligence in complying with the requirements of the regulations

The Contractor shall be assumed to be conversant with the requirements mentioned above. Should any requirement, by-law or regulation, which contradicts the provisions of this document, apply or become applicable during the erection of the installation, such need, by-law, or regulation shall overrule this document, and the Contractor shall immediately inform the Ministry of such a contradiction. Under no circumstances shall the Contractor carry out any variations to the installation in terms of such disclaimers without obtaining the written permission from the Engineer.

1.4 SITE CONDITIONS

Tenderers are advised to visit the site and acquaint themselves with all local conditions on the execution of the installation before the tender closing date. No claims from the Contractor which may arise from insufficient knowledge of site access, type of site, labour conditions, establishment space, transport and loading/unloading facilities, power etc., will be considered after submission of tenders.

A visit will be arranged for all interested parties for services requiring prior permission before contractors can visit the site.

1.5 ARRANGEMENTS WITH THE SUPPLY AUTHORITY

The Contractor shall give all notices required by and pay all necessary fees, including any inspection fees, which may be due to the local Supply Authority unless specified to the contrary.

It shall be the Contractor's responsibility to make the necessary arrangements with the local Supply Authority at his own cost and supply the labour, equipment, and means to inspect, test, and commission the installation to the satisfaction of the Local and Supply Authorities.

The Contractor shall supply and install all notices and warning signs that are required by the relevant laws, regulations and Documents.

1.6 MATERIAL AND EQUIPMENT

All material and equipment shall conform in respect of quality, manufacture, tests, and performance, with the South African Bureau of Standards requirements or where no such standards exist, with the relevant current Specification of the British Standards Institution.

All material and equipment shall be high quality and suitable for on-site conditions. These conditions shall include weather conditions and conditions under which materials are installed, stored and used. Should the materials not be ideal for use under temporary site conditions, the Contractor shall provide suitable protection at his own cost until these unfavourable site conditions cease to exist.

The Contractor shall, where requested to do so, submit samples of equipment and material to the Ministry for approval before installation. The samples may be retained in the office of the Engineer's possession until the contract is completed, after which they will be returned.

1.7 CODES OF PRACTICE OR STANDARD SPECIFICATION

Where reference is made to any Code of Practice or Standard Specification in this document, the latest edition or amendment shall be applicable, except where specified to the contrary.

2 SECTION B: INSTALLATION SPECIFICATIONS

2.1 INSTALLATION AND TERMINATION OF CONDUITS AND CONDUIT ACCESSORIES

2.1.1 Scope

This section covers the installation of conduits and conduit accessories in buildings and other structures under normal environmental conditions and for system voltages up to 600 V.

The following types of conduit installations are included:

- Non-metallic conduit.
- Flexible conduit.
- Conduits may be installed as follows:
 - In open roof spaces.
 - Surface-mounted against walls, concrete slabs etc.,
 - In-wall chases.

Where conduits are to be installed in concrete, this shall be undertaken while the building work is still in progress. The conduits may only be surface mounted were specified by the client.

Under no circumstances will conduit having a wall thickness of less than 1,6mm be allowed in screeding laid on top of concrete slabs.

Bending and setting of conduit must be done with special bending apparatus manufactured for the purpose and obtainable from the manufacturers of the conduit systems. Damage to conduit resulting from incorrect bending apparatus or methods applied must be removed entirely and rectified on the indication by the Project's inspectorate staff. Any wiring already drawn into such damaged conduits must be completely renewed at the Contractor's expense.

Tenderers must ensure that general approval of the proposed conduit system to be used is obtained from the local electricity supply authority before submitting their tender. Under no circumstances will consideration be given by the client to any claim submitted by the Contractor resulting from a lack of knowledge concerning the supply authority's requirements.

The conduit used shall have an external diameter of 20mm for light and socket-outlet circuits. In all other instances, the conduit sizes shall be following the "Wiring Code" for the specified number and size of conductors, unless otherwise indicated on the drawings.

2.1.2 Other Services

Conduits may not be installed closer to 150 mm to pipes containing gas, steam, hot water, or other materials, damaging the conduits or conductors. Conduits may not touch pipes of other service installations to prevent electrolytic corrosion. Where this is unavoidable, cathodic protection shall be provided.

Conduit and conduit accessories used for flame-proof or explosion-proof installations and the suspension of luminaries as well as all load-bearing conduit shall in all instances be of the metallic screwed type. Connecting of Conduit to Metal Equipment/Components

Any part of a non-metallic conduit system must be connected to metal equipment or components (e.g. switchboard, surface socket-outlet or switch box, existing metallic conduit system, etc.) fittings and joints explicitly manufactured for this purpose must be used. Non-metallic conduit must not be threaded to fit metallic connectors.

2.1.3 Bends

In conduit of nominal size not exceeding 25 mm, bends must be achieved by using accessories introduced into the conduit run. Bends shall comply with SANS 10142.

2.1.4 Bending

Conduit of nominal size up to and including 25mm may be cold-bent by hand provided that the radius of the bend is greater than six times the conduit's nominal size and that the bend's external angle does not exceed 90°. The procedure (which involves the use of a bending spring) should be as follows:

Determine the angle through which the conduit is to be bent.

Warm the cold conduit over the length to be bent by rubbing with hands.

Select a bending spring that matches the conduit size and insert it to the conduit at the point where the bend is required.

Bend the conduit slowly with one motion (either with the hands alone approximately 1 m apart or across the knee) to double the required angle release the conduit. When its position is stable, withdraw the bending spring (turning it in an anti-clockwise direction to reduce its diameter) and gently correct the angle.

Install and secure the conduit immediately after the following bending.

2.1.5 Cutting

A fine-tooth hacksaw should be used to cut the conduit to the required length. Each cut end should be square and free from swarf, burrs and loose material. When determining the length of the conduit to be cut, allowance must be made for the length of couplings or accessories attached to the conduit. Incorrect determination will cause bulging of the conduit or insufficient joint length.

2.1.6 FLEXIBLE CONDUIT

The installation shall comply with SANS 10142.

Flexible conduit shall preferably be connected to the remainder of the installation employing a draw-box. The flexible conduit may be connected directly to the end of a conduit if an existing draw-box is available within 2 m of the junction and if the flexible conduit can easily be rewired.

Flexible conduit shall consist of metal-reinforced plastic conduit or PVC-covered metal conduit with an internal diameter of at least 15mm, unless approved to the contrary. The Connectors for coupling to the flexible conduit shall be of the gland or screw-in type, manufactured of either brass or mild steel plated with zinc or cadmium.

2.1.7 INSTALLATION REQUIREMENTS

2.1.7.1 Positions of Outlets

All accessories such as boxes for socket-outlets, switches, lights, etc., shall be accurately positioned. It is the responsibility of the Contractor to ensure that all outlets are installed level and square, at the correct height from the floor, ceiling or roof level and in the correct position relative to building lines and equipment positions as specified. It shall be the Contractor's responsibility to determine the correct final floor, ceiling and roof levels in conjunction with the Main Contractor. Draw-boxes shall be installed in inconspicuous positions to the approval of the Engineer and shall be indicated on the "as-built" drawings. Draw-boxes shall not be installed in positions where they will be inaccessible after the installation.

2.1.7.2 Cover plates

All draw-boxes and outlets shall be fitted with cover plates, either as part of the switch or socket assembly or with blank cover plates if unused. Blank cover plates shall match other cover plates in the same area. Flush mounted cover plates in both ceilings and walls shall overlap the draw-box and edges of the recess. If the fixing lugs are substantially deeper than the finished wall surfaces, suitable coiled steel wire or tubes shall be used as spacers.

2.1.7.3 Draw-wires

Galvanised steel draw wires shall be installed in all unwired conduits, e.g., for future extensions, telephone installations, and other services.

2.1.7.4 Bends

A maximum of two 90 bends or the equivalent displacement will be allowed between outlets and boxes.

2.1.7.5 Wall Socket-outlets

Where more than one socket-outlet is connected to the same circuit, the conduit shall be looped from one outlet box to the following on the same circuit.

2.1.7.6 Luminaires

Where the conduit end is used to support luminaires, a ball-and-socket type lid shall be fitted to the pendant box in all cases where the conduit is longer than 500 mm. In all other cases, a dome lid may be used. Where luminaires are specified which are fixed directly to the pendant box, the pendant box shall be fixed independently of the conduit installation except where the pendant box is cast into concrete.

2.1.7.7 Flush Mounted Outlet Boxes

The edges of flush-mounted outlet boxes shall not be deeper than 10 mm from the final surface. Spacer springs shall be used under screws where necessary.

2.1.7.8 Defects

Each length of conduit shall be inspected for defects, and all burrs shall be removed. All conduits that are split dented, or otherwise damaged or any conduits with sharp internal edges shall be removed from the site. The Contractor shall ensure that conduits are not blocked.

2.1.8 SURFACE INSTALLATIONS AND INSTALLATIONS IN ROOF SPACES

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified, conduit installed on the surface must be plumbed or levelled, and only straight lengths shall be used.

2.1.8.1 Appearance

All conduits shall be installed horizontally or vertically as determined by the route, and the Contractor shall take all measures to ensure a neat installation.

Where conduits are to be installed directly alongside door frames, beams, etc., that are not true, conduits shall be installed parallel to the frames, beams, etc.

2.1.8.2 Saddles

Conduits shall be firmly secured using saddles and screws and following SANS 10142. The conduits shall be secured within 150 mm before and after each 90° bend and within 100mm of each outlet box.

2.1.8.3 Joints

Joints will only be allowed in surface conduit lengths exceeding 3,5 m. Threads shall not be visible at joints of completed installations, except where running joints are used. Running joints will be allowed only when necessary. All running joints shall be provided with locknuts and shall be painted with the red lead immediately after installation.

2.1.8.4 Accessories

Inspection bends or tee pieces shall not be used. Non-inspection type bends may be used in the case of 32mm or 50 mm diameter conduits. All draw-boxes supporting luminaries or other equipment shall be fixed independently of the conduit installation.

2.1.8.5 Offsets

Where an offset is required at conduit terminations or crossovers, the conduit shall be saddled at the offset.

2.1.8.6 Cross-over

Conduit routes shall be carefully planned to avoid crossovers. Where a crossover is inevitable, one conduit only shall be offset to cross the other. Crossovers shall be as short as possible and shall be uniform. Alternatively, crossovers shall be installed in purpose-made boxes. This method shall be employed on face brick walls and other circumstances required by the Engineer.

2.1.8.7 Parallel Conduit

Parallel conduit runs shall be equidistant, and saddles shall be installed. Alternatively, a special clamp may be used to secure all conduits in unison. In the case of conduits of different diameters, the latter method shall only be used if a purpose-made clamp designed to accommodate the various conduit sizes is provided.

2.1.9 CHASES AND BUILDER'S WORK

Except where otherwise specified, the Builder or Main Contractor shall be responsible for the builder's work related to the installation of conduits, outlet boxes, switchboard trays, bonding trays and other wall outlet boxes and will undertake the necessary chasing and

cutting of walls and the provision of openings in ceilings and floors for luminaries and additional electrical outlets. The Contractor shall notify the Builder or Main Contractor of his requirements. The responsibility lies with the Contractor to ensure that all builder's work is indicated or marked following his requirements.

Electrical materials to be built in must be supplied, placed and fixed in position by the Contractor when required by the Builder or Main Contractor. The Contractor shall also ensure that these materials are installed correctly.

2.2 FIXING MATERIALS

2.2.1 RESPONSIBILITY

The Contractor's responsibility is to position and securely fix conduits, ducts, cables and cable channels, switchboards, fittings, and all other equipment or accessories as required for the installation. The Contractor shall provide and fix all supports, clamps, brackets, hangers and other fixing materials.

2.2.2 SCREWS AND BOLTS

Where holes exist in equipment to be fixed, bolts and fixing screws as specified shall be used. Where sizes are not specified, the largest bolt or screw that will fit into the hole shall be used.

2.2.3 WALL PLUGS

Where the fixing holes in brick or concrete walls are smaller than 10mm dia. and where the mass of the equipment is less than 10kg, wall plugs may be used to fix conduits, cables and other equipment.

2.3 WIRING

This section covers wiring in approved wire-ways for electrical installations in buildings or other structures under normal environmental conditions for 50 Hz systems not exceeding 600 V.

2.3.1 TYPE OF CONDUCTORS

PVC-insulated or equivalent, stranded copper conductors and green/yellow PVC-insulated copper earth conductors comply with the quality Specification. Only where cables are specified or in instances where the exceptions stipulated in SANS 10142 are applicable may, the Contractor deviate from this requirement.

2.3.2 WIRE-WAYS

All unarmoured conductors shall be installed in conduits, cable channels (trunking) or power skirting and shall under no circumstances be exposed. Cable channels and power skirting shall be of metal construction unless approved explicitly to the contrary.

2.3.3 ORDER OF WORK

Wiring shall only be carried out after the wire-way installation has been completed but before painting has commenced.

2.3.4 CIRCUITS

Conductors that are connected to different switchboards shall not be installed in the same wire-way. The wiring of one circuit only will be allowed in a 20 mm dia. conduit except for the wiring from switchboards to fabricated sheet metal boxes close to switchboards, in which case more than one circuit will be allowed. For larger conduit sizes, the requirements of SANS 10142 shall be met.

2.3.5 VERTICAL CONDUIT INSTALLATION

Conductors installed in vertical wire-ways shall be secured at intervals not exceeding 5m to support the weight of the conductors. Clamps shall be provided in suitable draw boxes for this purpose.

2.3.6 CONNECTIONS

The conductors' insulation shall only be removed over the portion of the conductors that enter the terminals of switches, socket outlets or other equipment. When more than one conductor enters a terminal, the strands shall be securely twisted together. Under no circumstances shall strands be cut off.

2.3.7 EARTHING CONDUCTORS

When earth continuity conductors are looped between equipment terminals, the looped conductor ends shall be twisted together and then soldered or ferruled to maintain earth continuity when the conductors are removed from a terminal.

The installation shall be earthed to comply with SANS 10142.

The installation shall be bonded to comply with SANS 10142.

2.3.8 COLOURS

The colours of conductor insulation shall comply with SANS 10142. The colours of conductors for sub-circuits shall as far as possible correspond with the colour of the supply phase. The colours of conductors for wiring to two-way and intermediate switches shall preferably differ from the colour of phase conductors.

2.3.9 SINGLE-POLE SWITCHES

Single-pole switches shall be connected to the phase conductor and not to the neutral conductor.

2.3.10 SIZE OF CONDUCTORS

Where conductor sizes are not specified, the following minimum conductor sizes shall be used:

- Lighting circuits: 1,5mm² and 1.5mm² copper earth conductor
- Socket-outlet circuits: 2,5mm² and 2,5mm² copper earth conductor
- Aircon isolators: 2,5mm² and 2,5mm² copper earth conductor
- Heating Elements: 2,5mm² and 2,5mm² copper earth conductor
- Geysers: 2,5mm² and 2,5mm² copper earth conductor
- Cooker: 4mm² and 4mm² copper earth conductor

2.4 INSTALLATION OF LIGHT SWITCHES AND SOCKET-OUTLETS

2.4.1 GENERAL

2.4.1.1 Standards

Light switches and socket-outlets shall comply with the quality specification for "LIGHT SWITCHES. Surface or flush mounted boxes and cover plates, complying with the quality specification for "CONDUIT AND CONDUIT ACCESSORIES", shall be provided.

2.4.1.2 Position of Outlets

Switches and socket outlets shall be accurately positioned by the drawings. The Contractor's responsibility is to ensure that all outlets are installed level and square, at the correct height from the floor and at the correct position relative to building lines and equipment positions as specified. The Contractor's responsibility is to determine the correct final floor level and ceiling level in conjunction with the Main Contractor.

2.4.1.3 Cover Plates

All switches and socket outlets shall be fitted with standard metal cover plates. The colour of cover plates shall be as specified or shall otherwise match the surrounding finishes as closely as possible. Unless specified to the contrary, ivory cover plates shall be installed on painted walls. Cover plates in the same area shall have the same colour. Flush mounted cover plates shall overlap the draw-box and edges of the recess. Cover plates shall under no circumstances be cut unless authorised by the Engineer.

2.4.1.4 Escutcheon Plates

The escutcheon plate shall fit closely around the outlet boxes and be fixed independently of the boxes and cover plates. Bevelled cover plates shall be fixed to the outlet boxes and fit firmly against the escutcheon plate.

2.4.1.5 Appearance

The sides of adjacent switches, plugs, push-buttons etc., shall be parallel or perpendicular to each other and uniformly spaced. A common escutcheon plate shall be placed around flush-mounted outlets and accessories where the standard cover plates do not cover the cut-outs in the finishes.

2.4.1.6 Deep Boxes

Where switch or socket-outlet boxes have been set deep, spiral type steel wire spacers shall be used to fix the yoke of the switch or socket.

2.4.1.7 Walls

In cases where socket-outlets must be mounted at a nominal height of 300mm and where the lower portion of the wall consists of face bricks and the upper portion is plastered, the outlets shall be installed in the plastered portion of the wall. If the wall's plastered portion commences 500mm or more above floor level, the outlets shall be installed in the face bricks. Where a wall has different surface finishes, the outlets shall be installed within the same finish and not in the dividing lines between the different wall finishes. All outlets shall be installed at least 150mm away from door frames.

2.4.2 INSTALLATION OF LIGHT SWITCHES

2.4.2.1 Mounting

Light switches shall be installed 1,4m above finished floor level unless specified to the contrary. Mounting heights given shall be measured from the finished floor level to the centre of the switch. All single switches shall be installed with the long side of the toggle vertical.

2.4.2.2 Doors

Unless specified to the contrary, switches adjacent to doors shall be installed on the side containing the lock. If the position of the lock is not shown on the drawings, the position shall be verified before the switch-box is installed. Switch boxes in brick or concrete walls shall be installed 150mm from the door frame. Light switches installed in partitions or door frames shall be of the type designed for that purpose.

2.4.2.3 Walls

Where the lower portion of a wall is face brick and the upper portion plastered, light switches shall be installed wholly in the plaster provided that the lower edge of the plaster is not higher than 1,6m above the finished floor level. I

2.4.2.4 Partitions

Light switches installed in partitions shall preferably be of the type designed to be accommodated in the partition construction. Switches installed in the metal supports do not require switch boxes. Switches may not be flush mounted in partition walls without switch boxes.

2.4.2.5 Watertight Switches

Switches exposed to the weather or installed in damp areas shall be of the watertight type, complying with the quality specification for "WATERTIGHT SWITCHES".

2.4.2.6 Multiple Switches

Where several switches are required in one position, multi-lever switches in a common switch box shall be provided wherever possible. All circuits wired into this box shall be on the same phase so that voltages over 250 V are not present in the box. Where it is not possible or practical to do this, barriers shall be installed, and a label shall be prominently displayed within the box stating that voltages above 250 V are present.

2.5 B.6 PHOTO-ELECTRIC DAYLIGHT SENSITIVE SWITCH FOR OUTSIDE LIGHTING

2.5.1 INSTALLATION

The outside lighting of each building, i.e. light circuits marked "L0" on the drawings, shall be controlled by photo-electric daylight sensitive switches.

The positions of the switches as indicated on the drawings are provisional, and the exact positions shall be confirmed with the Engineer on site.

Individual outside lighting circuits on a building may be connected directly to the daylight sensitive switch.

Where two or more lighting circuits are to be controlled by a single daylight sensitive switch, a contactor actuated by the unit shall be provided in the switchboard.

A by-pass switch enabling the lights to be turned on at any time shall be provided.

2.5.2 CONSTRUCTION

The unit shall comprise a photocell, thermal actuator and change-over switch. The unit's cover shall be manufactured from a rigid, durable material protecting against tampering. The cover shall have good weathering properties. It shall be ultraviolet-resistant and not deteriorate when exposed to sunlight for prolonged periods.

2.6 INSTALLATION OF LUMINAIRES

2.6.1 POSITIONS

The mounting positions of luminaires shall be verified on site. All luminaires shall be placed symmetrically concerning ceiling panels, battens, beams, columns or other architectural features of the space unless otherwise indicated.

2.6.2 COVER PLATES

Cover plates shall be fitted over all draw-boxes and outlets intended for luminaires that are not covered by the luminaires canopy, lamp-holder, ceiling rose or similar accessories.

2.6.3 FIXING TO DRAW-BOXES

Where an outlet box or draw-box provides the necessary support for a luminaire, all luminaires except for fluorescent luminaires mounted against ceilings shall be fixed directly to the box. Fluorescent luminaires and luminaires with a mass above 10kg shall be suspended independently of the outlet box.

2.6.4 HANGERS AND SUPPORTS

Where provision has not been made for fixing luminaires, the Contractor shall supply the necessary supports, hangers, conduit extensions, angle brackets, or any other fixing method approved by the Engineer.

2.6.5 SUSPENDED LUMINAIRES

The necessary hangers shall be provided where luminaires which are of the non-suspension type have to be fixed below false ceilings or roof slabs. The use of 20mm conduits fixed to the roof slab or ceiling is preferred. Provision shall be made for adjustments to enable the levelling of luminaires.

2.6.6 SUSPENDED WIRING CHANNELS

Luminaires (especially fluorescent luminaires) may also be suspended from ceilings utilising suspended metal channels. The metal channel may be supported by conduits or threaded rods. Should metal rods be used, these shall be screwed to anchor bolts fixed in the roof slab. Wiring shall either be installed in conduits fixed to the metal channel or in the metal channels and covered with a suitable cover plate. Purpose-made clamps shall be used to fix the luminaires to the cable channel.

2.6.7 CEILING BATTENS

Where wooden blocks are used to suspend luminaires, ceiling battens shall not be cut. The wooden blocks shall be cut to fit around battens and shall be screwed to the ceiling. However, Battens may be cut where fluorescent or incandescent luminaires with metal canopies have to be installed against a false ceiling.

2.6.8 LED FIXED TO CEILINGS

In all cases where luminaires are fixed to false ceilings, the Contractor shall ensure that the ceiling can carry the weight of the luminaires before commencing installation. Should any doubt exist in this regard, the matter shall be referred to the Engineer.

In cases where the weight of the luminaire is not carried by the ceiling but by support or other suspension methods, the provision shall be made to prevent relative movement between the ceiling and luminaire, ceiling rose or connection point.

2.6.9 TYPE OF CONDUCTOR

Unless protected by an approved heat-resistant sheathing, PVC-insulated conductors shall not be used where the insulation temperature is likely to exceed 70°C. In unventilated luminaires or luminaires capable of housing incandescent lamps over 60W, the interconnecting wiring from the lamp-holder to the circuit wiring shall consist of silicon-rubber insulated conductors. Silicon-rubber insulated conductors shall be used exclusively in the case of high bay fittings. Refer also to the provisions of SANS 10142.

2.7 CONNECTIONS TO EQUIPMENT

2.7.1 GENERAL

This section covers the final electrical connections to switchboards and various equipment in general electrical installations under normal environmental conditions for system voltages up to 600 V. Refer to the standard specifications for "WIRING" and "INSTALLATION OF CABLES".

2.7.2 CONNECTIONS TO SWITCHBOARDS

Where sufficient space for conduit entries as well as adequate space for future conduit entries is available, conduits may be terminated directly on the switchboard.

Lighting and socket-outlet circuits may be separately grouped in common conduits or metal ducts (trunking) from the distribution board to the draw-box. The draw box shall be made of sheet steel with a minimum thickness of 1,6mm and shall be fitted with a removable cover plate.

2.7.3 CONNECTIONS TO MOTOR-DRIVEN EQUIPMENT.

An isolator or starter containing an isolator shall be installed within 2m of motor-driven equipment. The requirements of SANS 10142 shall be met. If this isolator cannot be installed on a wall, switchboard or another suitable place, an approved free-standing pedestal shall be provided. The pedestal shall be 1m high and outside normal walkways, access routes, etc.

2.7.4 CONNECTIONS TO WATER HEATERS

Each water heater shall be connected to a separate circuit with a separate earth conductor.

The conduit from the switchboard to the water heater shall terminate in a draw-box within 1 m of the water heater terminals. The connection from the draw-box shall be conductors in conduit or PVC-insulated cable. In instances where heaters are mounted out of normal reach, flexible conduit and round boxes with dome lids may be used for the final connection.

The mounting of the water heater and the provision of the water connections will be undertaken by others. The Contractor shall ensure that the elements and thermostats can easily be replaced.

Before testing a water heater, the Contractor shall confirm that the unit is filled with water with the Plumbing Contractor.

Unless otherwise specified in the Detail Technical Specification, the wiring of water heater circuits not exceeding 4 kW shall consist of 4mm² conductors and 2,5mm² earth conductors.

Unless it is specified that isolators for water heaters shall be provided in the switchboard, a local isolator shall be provided for each water heater. In the case of water heaters not exceeding 4 kW, a 30 A double-pole metal-clad isolator shall be surface mounted over the flush conduit outlet box.

2.7.5 CONNECTIONS TO HEATERS, FANS AND AIR CONDITIONING UNITS

2.7.5.1 Isolators

A flush-mounted suitably rated double-pole isolator shall be provided within 1m of the unit. The isolator shall be installed at 1,5m above floor level where the equipment is mounted out of reach. Only where units are mounted in easily accessible positions and where an isolating switch is incorporated in the unit, may this isolator be omitted. Where flush isolators are used, a flush conduit shall be installed to link with the equipment outlet point. Flexible cords of sufficient rating may be used for the final connection to the equipment.

The minimum conductor size to be used shall be 4 mm². Each fan, heater or air-conditioning unit shall be on a separate circuit.

The Contractor shall allow for the extractor fans' supply, installation, and electrical connection in ablutions and to the light control switch.

Brass bushes shall be provided to protect the wiring at the rear cable entries to the control unit and fan connection box.

2.8 EARTHING

This section covers the earthing of electrical installations in buildings or other structures. The total earthing system of any electrical installation shall be in complete accordance with SANS 10142.

2.8.1 RECOMMENDATIONS ON THE PRACTICAL INSTALLATION OF EARTH ELECTRODES

Practical earth must prevent dangerous overvoltages arising between metallic structures, frames, supports or enclosures of electrical equipment and the ground during fault conditions.

Practical earth must permit fault currents of sufficient magnitude to flow to operate protective devices to isolate the fault before damage can occur.

The ohmic resistance of practical earth must be low enough to ensure that the step potential on the ground in the vicinity of the earthing point is within safe limits under fault conditions, i.e. a voltage gradient not exceeding 40 V/m for fault durations exceeding 1s.

2.8.1.1 Types of Earth Electrodes

Three types of earth electrodes are suitable:

Trench earth comprises a bare copper or galvanised iron conductor laid at a minimum of 800mm below ground level, usually when underground cables are installed. This type of earth electrode provides a relatively large contact area between the electrode and surrounding ground, makes contact with various types of soil and soils of varying moisture content and route and is economical to install.

Spike earth comprises rods of bare copper, copper-coated steel, stainless steel or galvanised steel designed to penetrate the ground to depths of up to several metres. Low resistance earth may sometimes be obtained by driving multiple spikes at some distance from each other to provide parallel paths.

2.8.1.2 Materials for Earth Electrodes

Bare copper, either in stranded, strip or rod form, is considered the most suitable general-purpose material for earth electrodes. Its main disadvantage is its cost and susceptibility to theft.

Bare galvanised iron and steel, either in stranded, strip or rod form, has a satisfactory survival record in non-aggressive soils and is more economical than copper.

Bare aluminium is unsuitable as electrode material.

2.8.1.3 Corrosion

Because galvanised ferrous metals corrode sacrificially to copper, galvanised iron and steel electrodes should not be buried near bare copper.

2.8.2 Distribution Systems

The earthing system shall follow the Multiple Earthed Neutral (MEN) and Protective Multiple Earthing (PME) systems.

Distribution equipment associated with transformer substations that are either ground mounted or pole mounted and fed by underground cable or overhead line, with or without an earth continuity conductor (ECC), should be installed, connected and earthed following the requirements:

The overall resistance to earth of the neutral of an LV distributor or distribution system must not exceed 10 ohms.

The LV neutral may be connected to other supply neutrals, earth electrodes, cable sheaths and armouring and these connections are used to obtain the required earthing value of 10 ohms or less.

The neutral of underground and overhead LV distributors must be earthed at the remote ends of each distributor.

Where the overall resistance to earth of the neutral of the distribution system exceeds 10 OHMS, the neutral shall be earthed at intermediate positions on the distributor/s to reduce its resistance to earth to below this limit.

The cross-sectional area of the neutral of all LV distributors must not be less than that of a phase conductor.

No circuit-breakers, isolators, fuses, switches, or removable links shall be installed in the neutral between the transformer star point and any LV distributor or service connection remote end.

All metallic sheathing and armouring of cables and all metalwork associated with meter cabinets, fuse pillars, etc., supporting or enclosing LV cables shall be bonded to the distributor neutral conductor.

A Separate Neutral Earth (SNE) cable is part of a MEN or PME system; the armouring and metallic sheath and any ECC shall be bonded to the neutral at the supply end of the cable.

Compression fittings or double bolted connectors are recommended to make all connections and joints on or to overhead line conductors.

MEN or PME may be applied to any LV distributor without alterations to other LV distributors supplied from the same transformer.

2.8.3 Protective Neutral Bonding (PNB) System

Since the neutral is earthed at one point only, the question of multiple earthing does not arise, and there is no necessity to meet the MEN/PME technical requirements.

2.8.3.1 PME System

All service connections must utilise a cable with an insulated phase and an insulated neutral conductor.

A single-phase service comprises a live conductor and a neutral.

A polyphase service connection comprises two or three-phase conductors and a neutral.

The consumer's earthing lead is connected to the supplier's neutral and to a mandatory earth electrode at the consumer's supply point.

A label must be attached at the consumer's supply point on his premises, indicating that the installation is part of a PME system.

Note: It is not recommended that the PME system be applied to supply traffic signals, street signs or other power-consuming equipment installed in public places because the PME system is inherently unsafe under "broken-neutral" conditions.

2.8.4 EARTHING OF A GENERAL ELECTRICAL INSTALLATION

2.8.4.1 General

All earth conductors shall be stranded copper with or without green PVC insulation. The conductors shall comply with the quality specification for "PVC-INSULATED CABLES".

2.8.4.2 Sub-circuits

The earth conductors of all sub-circuits shall be connected to the earth busbar in the supply switchboard per SANS 10142.

2.8.4.3 Connections

Under no circumstances shall connection points, bolts, screws, etc., used for earthing be utilised for any other purpose. It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided. Unless earth conductors are connected to proper terminals, the ends shall be tinned and lugged.

2.8.4.4 Non-metallic Conduit

Where non-metallic conduit is specified or allowed, stranded copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including switch boxes, socket-outlet boxes, draw-boxes, switchboards, luminaries, etc. The securing of earth conductors utilising self-threading screws will not be permitted.

2.8.4.5 Flexible Conduit

An earth conductor shall be installed in all non-metallic flexible conduits. This earth conductor shall not be installed external to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

2.8.4.6 Water Pipes

Metal cold water mains shall be bonded to the Earth Busbar by solid 15 x 2mm copper strapping in the Main Switchboard. The nearest switchboard shall connect all other hot and cold water pipes by 12 x 0,8mm perforated or solid copper strapping (, not conductors). The strapping shall be fixed to the pipework by brass nuts and bolts, and against walls be brass screws at 150mm centres. In all cases where metal water pipes, downpipes, flues, etc., are positioned within 1,6 m of switchboards, an earth connection consisting of copper strapping shall be installed between the pipework and the board. In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each switchboard.

2.9 INSPECTIONS, TESTING, COMMISSIONING AND HANDING OVER

2.9.1 PHYSICAL INSPECTION PROCEDURE

Once the Contractor has completed the installation, written notice shall be given to the Engineer to arrange a mutually acceptable date for a joint inspection.

During the inspection, the Engineer will compile a list of items (if any) requiring further attention. A copy of this list will be provided to the Contractor, who will have a period of 7 days to rectify the offending items of the installation.

The Contractor shall then provide written notice that he is ready to inspect the remedial work to the offending items.

This procedure will continue until the entire installation has been correctly completed to the Engineer's satisfaction.

2.9.2 TESTING AND OPERATIONAL INSPECTION PROCEDURE

In addition to the above, the Contractor shall have the complete installation tested and approved by the local authorities where applicable.

After the above testing and approval, the Contractor shall, in the presence of the Engineer, test all circuits concerning:

- Phase balance.
- Insulation level.
- Polarity.

2.9.3 "AS-BUILT" DRAWINGS

As each portion of the work is completed, the Contractor shall provide the Engineer with as-built drawings showing the exact location measured from fixed points of all cables, each outlet point, etc.

In addition, a complete reticulation diagram showing all supply cables and switchboards shall be provided behind a plastic cover in the generator room adjacent to the Main Low Voltage Distribution Board.

The installation will not be regarded as complete until all of the above requirements listed above have been met.

3 SECTION C: QUALITY SPECIFICATIONS

3.1 CONDUIT AND CONDUIT ACCESSORIES

3.1.1 GENERAL

This section covers general installations' conduit and conduit accessories requirements under normal environmental conditions.

The type of conduit and accessories required for the service, i.e. whether the conduit and accessories shall be of the plain-end type or the non-metallic type and whether metallic conduit shall be black enamelled or galvanised, is specified in Part 2 of this Specification. Unless other installation methods are specified for certain circuits, the installation shall be in conduit throughout. No open wiring in roof spaces or elsewhere will be permitted.

The conduit and conduit accessories shall comply fully with the applicable SANS Specifications as set out below. The conduit shall bear the mark of approval of the South African National Standards.

3.1.2 SWITCH BOXES AND SOCKET-OUTLET BOXES

All switch boxes and socket-outlet boxes shall be manufactured of pressed galvanised steel of at least 1mm thickness. All boxes shall be fitted with integral lugs to suit standard flush-mounted switches and socket outlets manufactured per SANS 1085.

Light switch boxes shall be 100 x 50 x 50mm with two 20mm knockouts on the sides one 20mm knockout on the top, bottom, side and back.

Socket outlet boxes shall be 100 x 100 x 50mm with two 20mm knockouts on the top, bottom, sides and back.

Switch, and socket-outlet cover plates shall comply with SANS 1084.

3.1.3 FLEXIBLE CONDUIT

Where applicable, the flexible steel conduit and adaptors shall comply with BS 731, part 1. Flexible conduit shall be of galvanised steel construction and in damp areas of the plastic-sheathed galvanised steel type. Flexible conduit shall only be used as specified

3.2 PVC-INSULATED CABLES 600/1 000 V GRADE

3.2.1 GENERAL

This section covers the requirements for PVC-insulated cables for general installations under normal environmental conditions.

3.2.2 CONSTRUCTION

Cables shall be manufactured per SANS 1507, shall come only from fresh stocks, and shall be constructed as follows:

Unarmoured cables: PVC-insulated/PVC-sheathed

Armoured cables: PVC-insulated/PVC-bedded/armoured/black extruded PVC outer sheath

Single-core cables: PVC-insulated/unsheathed

The conductors shall be of high conductivity annealed stranded copper, and the cores may be shaped or circular.

The insulation shall be general-purpose PVC, 600/1 000V Grade.

The bedding shall consist of a continuous impermeable sheath of PVC extruded to fit the core or cores closely and, in the case of multi-core cables, to fill the interstices between the cores.

Where armouring is specified, it shall consist of one layer of galvanised steel wire in the case of multi-core cables and nonmagnetic metallic wire in the case of single-core cables. Aluminium strips or tape armouring is not acceptable.

Where specified, an earth continuity conductor shall be provided in the armouring per SANS 1507.

3.3 GLANDS FOR PVC-INSULATED CABLES

Glands used for terminating PVC/PVC/SWA/PVC cables shall be of the adjustable type.

Glands shall be suitable for general purpose 600/1 000 V Grade cable with steel armouring.

The glands shall be made of nickel-plated cadmium plated or in coastal area bronze or brass.

The glands shall consist of a barrel carrying a cone bush screwed into one end and a nickel-plated brass nipple carrying a nickel-plated brass or a heavy galvanised steel locknut screwed into the other end. The galvanising shall comply with SANS 32 & 121.

Non-watertight glands must be easily converted to watertight glands utilising a waterproofing shroud and inner seal kit. A concave groove shall be provided on the cable entry side of the barrel to accommodate the top rim of the waterproofing shroud.

The shrouds shall be made of non-deteriorating neoprene or other synthetic rubber and resistant to water, oil and sunlight. The shrouds shall fit tightly around the glands and cable.

3.4 WIRING TERMINALS

Terminal bodies and screws shall be non-corrosive metal, enclosed in fire-resistant, moulded plastic insulating bodies. Terminal bodies or screws shall not project beyond the insulating material and shall afford suitable protection against accidental contact by personnel, short circuits and tracking.

The construction of the terminal block and mounting rail shall be such as to ensure a firm and positive location of the terminal blocks. It shall be possible to add additional terminal blocks within the terminal sequence without disconnecting or dismantling the terminal strip. The terminal blocks shall be held in position using standard end clamps.

3.5 LIGHT SWITCHES

3.5.1 GENERAL

This section covers the requirements for switches for use in general installations under normal environmental conditions.

3.5.2 FLUSH AND SURFACE MOUNTED SWITCHES

All switches shall be suitable for mounting in 100 x 50 x 50mm boxes shall comply with SANS 1663 and shall bear the SANS mark.

Switches shall be of tumbler operated microcap type rated at 16A, 220/250V.

Switches shall have protected terminals for safe wiring.

Contacts shall be of silver material.

On multi-lever switches, it shall be possible to change any of its controls individually.

The yoke strap shall be slotted to allow for easy alignment.

The covers of surface-mounted switches shall have toggle protectors.

Where light switches are installed in partitions, they shall, where possible, be of the special narrow type intended for installation into the mullions.

3.5.3 COVER PLATES

Unless otherwise specified, cover plates shall be finished in ivory coloured baked enamel, anodised bronze or aluminium.

Cover plates shall overlap the outlet to cover wall imperfections.

Cover plates shall comply with SANS 1084.

3.5.4 WATERTIGHT SWITCHED SOCKETS

Watertight sockets' housing shall be of galvanised cast iron or die-cast aluminium with watertight machined joints.

The switch shall have a porcelain base and a quick-acting spring mechanism and shall be rated at 16A, 220/250V.

The ON/OFF positions shall be marked on the switch housing.

The socket openings shall be rendered watertight utilising a gasket cover plate that is screwed onto the unit's body. The cover plate shall be secured to the body of the unit using a chain.

3.6 LUMINAIRES FOR INTERIOR AND EXTERIOR APPLICATIONS

3.6.1 SCOPE

This specification covers the requirements for LED luminaires for general indoor use. The luminaires covered are open-channel, industrial, decorative and recessed types. They include luminaires with one or more lamps with standard wattage ratings as specified in the project specification. This specification does not include luminaires for use in special applications or atmospheres.

3.6.2 STANDARDS

The following standard specifications of the South-African National Standards shall apply to this luminaire specification:

- SANS 1119:Interior luminaires for fluorescent lamps.
- SANS 1464:Safety of luminaires.
- SANS 1041:Tubular LED lamps for general service.
- SANS VC 8031: Coatings applied by the powder-coating process.
- SANS 783: Baked enamels.
- SANS 10142: The wiring of Premises

Any standard referred to in the above specifications.

3.6.3 PHOTOMETRIC DATA

Photometric data sheets of the luminaire as prepared by a laboratory that complies with SANS requirements shall be submitted with the luminaire or demanded by the Engineer.

3.6.4 TECHNICAL INFORMATION

The Tenderer shall include full technical particulars regarding the luminaire offered with the tender. C9.1BULKHEAD LUMINAIRES INTERIOR AND EXTERIOR APPLICATIONS

3.7 FLOODLIGHT LUMINAIRES

3.7.1 SCOPE

This specification covers the requirements for LED 30W and 50W floodlight luminaires, for outdoor applications, with standard wattage ratings specified in the project specification.

3.7.2 GENERAL

The luminaire should preferably be manufactured within the Republic of South Africa and have at least 50% local content

Suppose the luminaire offered is of foreign origin. In that case, the Contractor must provide the technical performance and quality specifications.

A sample luminaire shall be provided for evaluation and approval by the Electrical Engineer before installation.

3.7.3 STANDARDS

The following standard specifications of the South-African National Standards and the International Electrotechnical Commission shall apply to this luminaire specification:

SANS 10142:	The Wiring of Premises.
SANS 60238 & VC8011	Lamp holders
SANS 1222:	Enclosures for electrical equipment.
SANS 1247:	Coatings applied by the powder-coating process.
SANS 1279:	Floodlighting luminaires.
SANS 1464:	Safety of luminaires.
SANS 1507:	Electric cables with extruded solid dielectric insulation for fixed installations.

Any standard referred to in the above criteria.

3.7.4 PHOTOMETRIC DATA

Photometric data sheets of the luminaire as prepared by a laboratory that complies with SANS requirements shall be submitted with the luminaire.

3.7.5 TECHNICAL INFORMATION

The Tenderer shall include full technical particulars regarding the luminaire offered with the tender.

3.8 CIRCUIT-BREAKERS

This section covers single or multi-pole moulded case circuit breakers in power distribution systems, suitable for panel mounting, for ratings up to 1 000 A, 600 V, 50 Hz.

The circuit breakers shall comply with SANS 156.

The continuous current rating, trip rating, and rupturing capacity shall be as specified.

The contacts shall be silver alloy and close with a high pressure wiping action.

Where specified, the circuit breaker shall be capable of accommodating factory fitted shunt trips or auxiliary contact units or similar equipment.

The operating handle shall provide a clear indication of "ON", "OFF" and "TRIP" positions.

The mechanism shall be of the TRIP-FREE type preventing the unit from being held in the ON position under overload conditions.

As far as is practical, all moulded case circuit breakers in a particular installation shall be supplied by a single manufacturer.

The incoming terminals of single pole miniature circuit breakers shall be suitable for connection to a common busbar.

The circuit breaker shall have a rating plate indicating the current rating, voltage rating and breaking capacity.

Extension type operating handles shall be provided for units of 600 A rating and above.

3.9 EARTH LEAKAGE RELAYS

Earth leakage relays shall be single or three-phase units with a sensitivity of 30mA with associated circuit breaker or on-load switch for use on 220/250V single phase or 380/433 V three-phase, 50 Hz, supplies.

The units shall be suitable for installing switchboards in clip-in trays or bolted to the chassis.

The earth leakage relay shall function on the current balance principle, comply with SANS 767 as amended, and bear the SANS mark. Integral test facilities shall be incorporated into the unit.

Circuit breakers with trip coils used integrally with earth leakage units (two-pole for single-phase units and three-pole for three-phase units) shall comply with SANS 156.

On-load switches used integrally with earth leakage units (two poles for single-phase units and three poles for three-phase units) shall comply with SANS 60497.

The fault current rating of the unit shall be 2,5kA or 5kA as required when tested per SANS 156.

3.10 TRIPLE POLE ON-LOAD ISOLATORS

This section covers switches suitable for panel mounting in power distribution systems up to 600 V, 50 Hz. Controls for motor isolation are included.

The switches shall be of the triple pole, hand-operated, complying with SANS 60947.

The switches shall have a high-speed closing and opening feature.

The switches shall be suitably rated for the continuous carrying, making and breaking of the rated current specified and the through-fault current capacity as specified.

The operating handles shall have a distinctive colour, and the switch shall be clearly and indelibly labelled "ISOLATOR".

3.11 TIME SWITCHES AND PHOTOCELLS

Time switches shall be of a single-pole type, suitable for 220/250 V systems, with contacts rated for the duty to be performed with a minimum of 15A. The contacts shall be of high-quality material, e.g. silver-plated or solid silver.

3.11.1 OPERATING CONDITIONS

The units shall be suitable for operating under dusty conditions between -5 EC and 55 EC temperatures.

3.11.2 TECHNICAL REQUIREMENTS

Units shall switch on when the light intensity drops to 15 lux + 20% and when the light intensity again reaches 40 lux + 20%.

When the unit is in the "on" position, there must be a delay of one minute if it were to switch off in the case of a sudden increase in the light intensity.

3.12 INDOOR SURGE ARRESTORS

Surge arrestors shall comply with the requirements of SANS 61643 or VDE 0675.

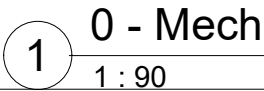
Surge arrestors shall be suitable for installation at altitudes of up to 1800m above sea level.

The unit shall be contained within a thermoplastic or cast resin housing, and all internal components shall be fully sealed in.

The unit shall be supplied complete with a galvanised steel mounting bracket for convenient mounting onto the metalwork or tray.

Alternatively, the unit shall be of the type which can be mounted into the clip-tray of a switchboard.

Surge arrestors shall be provided in all cases where a switchboard is supplied directly from an overhead line.

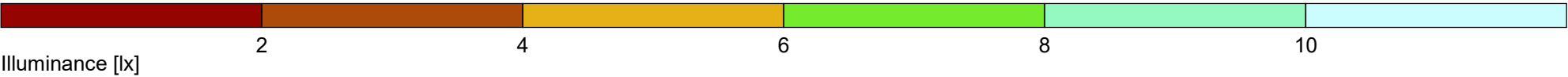
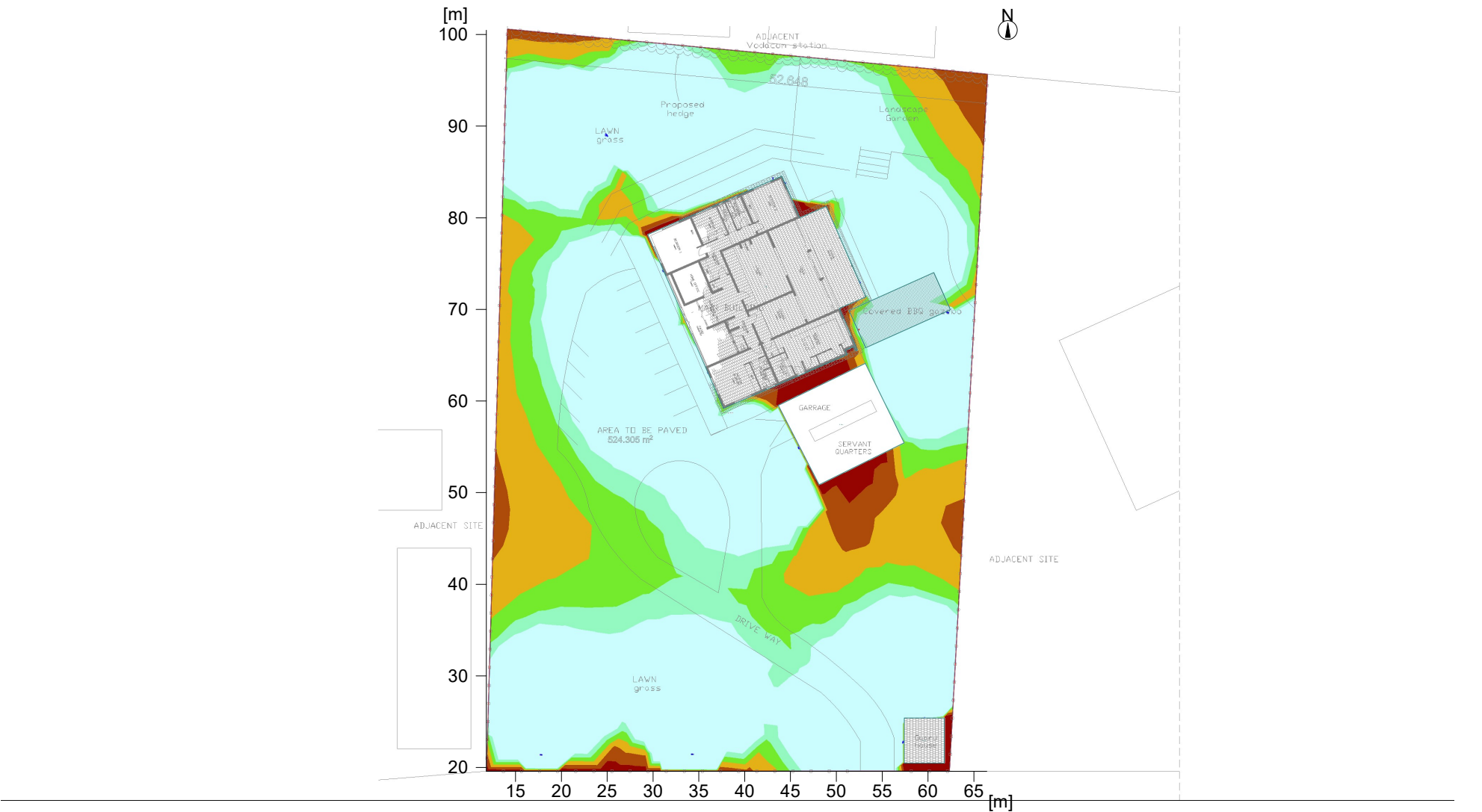


Discipline: Electrical Service	
Service: Earthing and lightning protection	
Drawing title: UNDP RC House	
Earthing and Lightning protection Layout- Ground Floor	
Ref no: 20220303	Designed: R. Mofenson
Scale: 1:90	Drawn: T. Matsoso
Date: 03/2022	Checked:
Drawing number:	20220303 E2 GF EE

1 Exterior 1

1.1 Summary, Exterior 1

1.1.1 Result overview, Evaluation area 1

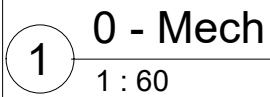


General	
Calculation algorithm used	Average indirect fraction
photometric centre height.	3.00 m
Maintenance factor	0.80
Total luminous flux of all lamps	248983 lm
Total power	2595.0 W
Total power per area (4038.29 m²)	0.64 W/m² (2.97 W/m²/100lx)

Evaluation area 1		Reference plane 1.1
		Horizontal
Em	21.6 lx	
Emin	0.1 lx	
Emin/Eav (Uo)	0.00	
Emin/Emax (Ud)	0.00	
Position	0.00 m	

Type No.\Make

		SECOM
11	13	Order No. : 4330 02 20 83
		Luminaire name : PROTEK Q2 200W
		Equipment : 88 x LED OSRAM OSLOM SSL / 216.795 lm
16	1	Order No. : 4125 01 08 83
		Luminaire name : / PROTEK LED 8W
		Equipment : 1 x OSRAM DURIS E5 8W 8 W / 969 lm



- | No. | DATE | AMENDMENT | BY |
|-----|------|-----------|----|
| | | | |



enercon group
engineering, energy & management

Drawing number: 20220301.E4.GF.EE



- Notes:
1. Use the existing cable for existing light fittings at the lawn grass area, covered BBQ gazebo, garage and guard house.
 2. Use the new cable for all light fittings at main building.
 3. Use the existing photocells for each circuit.
 4. L1 circuit must be powered from guard house DB.
 5. L2 & L3 circuits must be powered from main building DB.

LEGEND	
SYMBOL	DESCRIPTION
	200W LED FLOOD LIGHT
	EXISTING FLOOD LIGHT
	10W LED FLOOD LIGHT
	PHOTOCELL

No.	DATE	AMENDMENT	D.P.W.

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Tender Drawings

Certified Tender drawings as per SANS 10 142

Name: _____

Date: _____

Professional Registration no: _____

File name
UNDP RC House

Page type
A1

Consultant
enercon group
engineering, energy & management

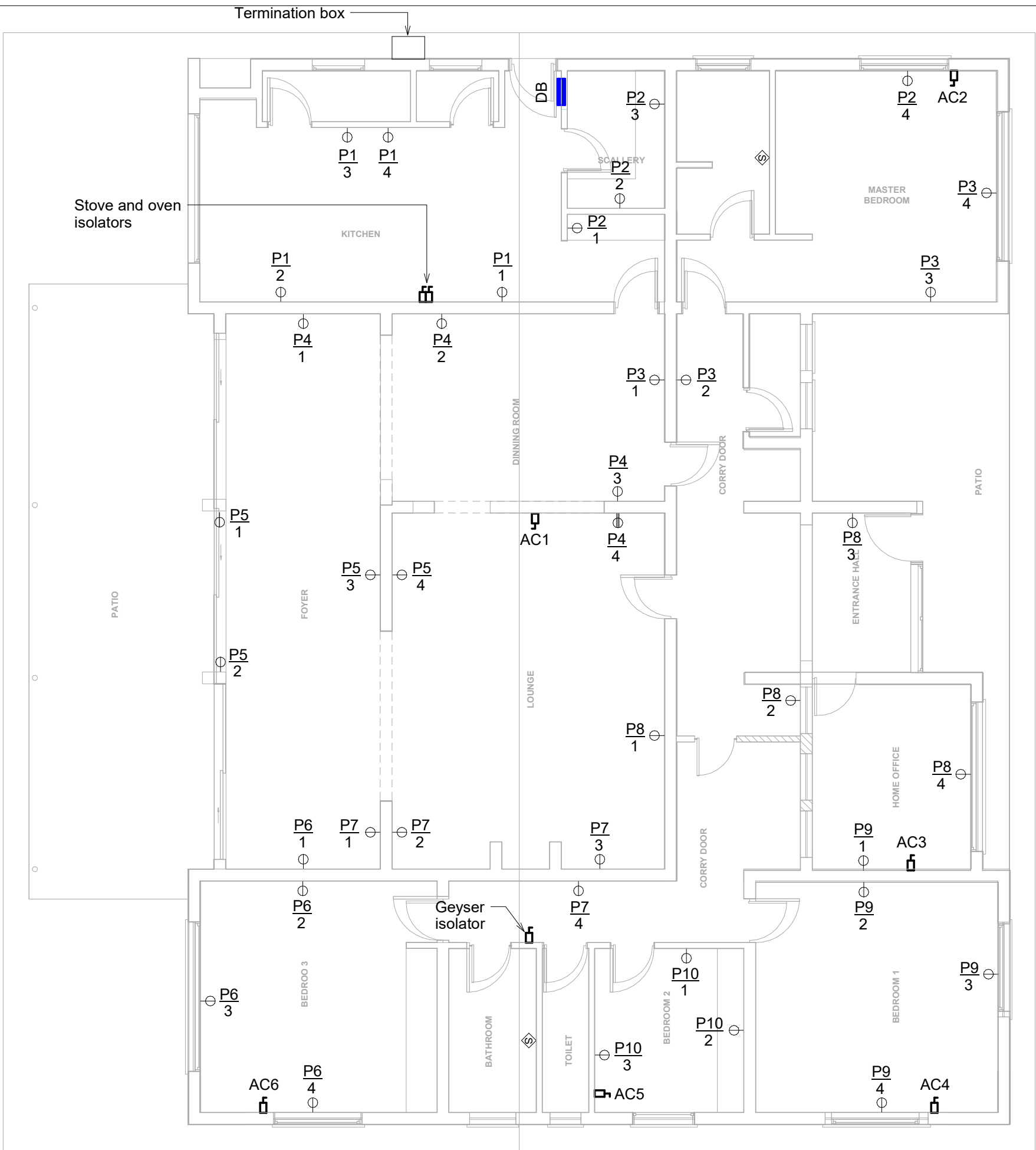
Discipline: Electrical service

Service: Lighting Layout

Drawing title UNDP RC House

Lighting Layout : Site Plan

Ref.no. 20220303	Designed R Monts'onyane
Scale: N/A	Drawn: T. Mahlelehele
Date: 03/03/2022	Checked: _____
Drawing number: 20220303.E4.SP.EE	



Notes:

- Relocate geyser isolator in the bathroom to a new position as per drawing.
- Geyser and aircon isolators must be 200mm below ceiling level.
- Remove the existing stove isolator from the right wall when entering the kitchen door, pull the wires and blank the space.
- For oven and stove isolators use the existing isolator point position.

LEGEND	
SYMBOL	DESCRIPTION
	DISTRIBUTION BOARD
	SWITCHED SOCKET OUTLET (SINGLE)
	SWITCHED SOCKET OUTLET (DOUBLE)
	SHAVER OUTLET
	STOVE, GEYSER, OVEN, SHAVER AND AIRCON ISOLATOR

No.	DATE	AMENDMENT	BY
Copyright vests in the Enercon group (Pty) Ltd			
Drawing Purpose: For Tender			
Certified drawings as per SANS 10 142			
Name: _____			
Date: _____			
Professional Registration no: _____			
File name: _____		Page type: _____	
UNDP RC House		A3	



Discipline: Electrical Service	
Service: Small Power	
Drawing title: UNDP RC House	
Small Power Layout- Ground Floor	
Ref.no: 20220303	Designed: I.Rapholo
Scale: 1:60	Drawn: T.Mahlelelele
Date: 03/2022	Checked: _____
Drawing number: 20220303 E3 GF EE	