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EXECUTIVE SUMMARY

ADQ Engineering Projects were requested to do a site investigation at SABS (South African Bureau of Standards) in Pretoria there is a lab with huge testing machines and equipment that need to be removed for new machines to be placed. Specific labes where identified to have new lights and power installed . The project will be carried out in sections as the lab will still be fully operational. SABS is looking for a reputable contractor who can carry out the renovations of the Lab.

The lights and electrical power will be installed as the requirements and specifications from the client and as indicated and specified on the drawings and the BOQ.

The Contractor is Required to:

- a. To consider that the Lab will be fully functional, and machines need to be always protected when carrying out work.
- b. To consider that other machines will require to be dismantled and moved somewhere specified by the client.
- c. To consider that work will be carried out in conjunction with the client's schedule of work

A compulsory tender briefing meeting will be held on site at a date to be confirmed.

The main offer shall be strictly in accordance with the subcontract documents. The tenderer may offer as an alternative, equipment and/or methods or standards other than those laid down in the tender documents, but acceptance or rejection thereof will be at the sole discretion of the Engineer.

Such deviations shall be individually declared at the time of tendering and shall be accompanied by all documentation necessary for adjudication of such deviations, which will not be binding on the Employer unless approved by him and incorporated in the subcontract.

1 INTRODUCTION

ADQ Engineering Projects was appointed to design and specify new lighting and power requirements for specific areas within the Lighting Lab at the SABS Head Offices in Groenkloof, Pretoria. This document describes the technical specifications and requirements for the installation of the electrical installation. The following drawings form part of the tender and must be read in conjunction with this document.

- P23072-PD-ELE-200 REV 0B -MG06A LIGHTING AND POWER LAYOUT
- P23072-PD-ELE-201-REV 0B – MG06B LIGHTING AND POWER LAYOUT
- P23072-PD-ELE-202-REV 0B – MG08 & EG04 LIGHTING AND POWER LAYOUT



Figure 1. Aerial Site View

2 ELECTRICAL SCOPE OF WORK

Provision for electrical work was included as a Provisional sum in the BOQ. The following work will be done :

- Remove old electrical sockets and lights (Where specified by the client)
- Supply, delivery and installation of new LED 1200mm x 600mm 6500K suspended ceiling luminaires
- Installation for trunking for electrical equipment
- Install 2 tier power skirting (Colour to be confirmed by client)
- Installation of switch socket outlets and isolators for electrical and mechanical equipment

3 ELECTRICAL REQUIREMENTS

3.1 ROOM MG06A

Ceiling

Install new LED lights with colour temperature 6500K, recessed type without reflectors. Light to be supplied with separate switch.

Install trunking on the floor for Automotive Goniometer wiring

Remove old lights

Installation of new switch socket outlets

Paint existing power skirting black

3.2 ROOM MG06B

Ceiling

New LED lights with colour temperature 6500K, recessed type without reflectors. Light to be supplied with separate switch.

Remove old lights

Power supply requirements

Electrical Power Connection according to the requirements for GO-R 3060

(1x CEEKON 3 Phase 400V / 32A + N + PE) without Earth leakage circuit breaker (ELCB) /residual-current device (RCD) Installed near to Control Racks

Remove old trunking and install new plugs

Passage

New LED lights with colour temperature 6500K, recessed type without reflectors. Light to be supplied with separate switch

Close wall lights with blank covers

3.3 ROOM MG06C

Disconnect old lights above new ceiling

Re-connect transformer

Align trunking and paint grey

Remove conduit and plugs

3.4 ROOM MG08

Ceiling

New LED lights with colour temperature 6500K, recessed type.

Remove old lights

MG Passage

New LED lights with colour temperature 6500K, recessed type.

3.5 ROOM EG04A

New LED lights with colour temperature 6500K, recessed type.

4 GENERAL AND INSTALLATION REQUIREMENTS

4.1 GENERAL ELECTRICAL SPECIFICATION

- This Specification covers the general requirements applicable to materials and equipment to be supplied, installed, tested and commissioned and should be read in conjunction with all the other parts of the Specification, and the Drawings.
- Should the Contractor not understand the contents of the Specification, he shall satisfy himself as to its full meaning before the closing date of Tenders, by clarifying all uncertainties with the Consultant.
- The type and quality of manufactured items may be implied by quoting a trade name or trade mark and this does not exclude the use of similar and equivalent products by other manufacturers.
- The Engineer's decision regarding the acceptability of alternative offers shall be final.

4.2 REGULATIONS

- The installation shall be carried out and completed such that the requirements of the latest issue(s) of the following by laws and/or regulations are complied with:
 - Code of Practice for the Wiring of Premises - SANS 10142.
 - The SA Factories, Machinery and Building Works Act (Act 22 of 1941) and the Act 80 of 1971 with Regulations.
 - The local Municipal By laws and Regulations as well as those of the local Electricity Supply Authority.
 - Local as well as National Fire Prevention Regulations.
 - The Regulations of the Telecommunication Authorities.
 - The Contractor shall be responsible for all arrangements with the local Electricity Supply Authority for connections to the supply network and to provide such labour, equipment and material to effect the connections, tests, commission and hand over of the installation.
 - All necessary notices shall be issued, provided and installed by the Contractor. The Contractor shall institute such precautionary measures as may be necessary to ensure the safety of persons and to prevent damage to property during the execution of the Contract.
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4.3 QUALITY AND STANDARDS

- Only material and equipment of the best quality, new and unused, free from defects, shall be used for this Contract. Workmanship shall be of the best quality and entirely satisfy the Engineer. Samples of all Material shall be available for approval by the engineer.
- Materials and equipment shall comply with the relevant SANS, BS and IEC Specification.
- If the SANS mark is available for specific materials or equipment, only items bearing the mark will be accepted.

4.4 LUMINAIRES AND LAMPS

- GENERAL
 - Light fittings shall be complete and working. (Preferably energy saving lights.)
 - All luminaries shall be supplied complete with lamp holder(s), lamp(s), internal wiring, control gear and all other components and accessories.
 - Flood lighting luminaries shall be manufactured to SANS 1279 and street lighting luminaries to SANS 1277. The minimum power factor shall be 0,9.
 - Outside lights and bulk heads shall be IP65 and energy saving units such as PL 26 with Metal back plates.
 - Types of lamps are specified in the Project Specification. In general The CLINET accepts only large body Florescent fittings, preferably T5 Tubes (Osram or Phillips: Colour 640 or Cool White) and all emergency fittings must be self-testing units.
 - The initial lamp lumen output shall be stated by the supplier, but the actual tested lumen output shall be used to calculate the specified illumination levels. Test certificates issued by a testing authority shall be used and submitted with the Tender.
 - If no test certificate is submitted, the Engineer reserves the right to select a number of lamps and have them tested by a selected test authority.
 - Lamps shall be packed separately and in boxes to avoid any damage.
 - Should the glass of the lamp not be touched with bare hands, such directions should be indicated on the outside of the box and on the wrapping material of each lamp.
 - GUARANTEE
 - Workmanship, material and control equipment installed in the light fittings shall be guaranteed for twelve (12) months from the Contract hand over date.
 - The cost of all material, labour, travelling, etc. incurred for repairs of luminaries during the guarantee period shall be for the account of the Contractor and all repairs shall be done on site.
 - TENDER INFORMATION
 - The following information regarding each type of lamp and luminaries combination shall be submitted:
 - Initial lamp lumen output,
 - Isolux diagram,
 - Luminous density diagram,
 - Complete drawings of fittings,
 - Manufacture and origin,
 - Availability of spares and
 - Suppliers of light fittings, lamps, spares, etc.
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- INSPECTIONS AND TESTS

- Luminaries can be inspected by the Engineer at any stage of manufacturing on the site of the supplier or manufacturer and any item not complying with the Specification can be rejected.
- All luminaries shall be inspected and tested by the manufacturer and shall be indelibly marked that they had passed these inspections and tests, before they leave the premises. Luminaries shall be wrapped in plastic or paper and suitably packed in boxes to prevent damage during transport or storage.

- MANUFACTURE

- Luminaries shall be attractively designed, but efficient operation shall not be forfeited.
- Streetlight lenses and bodies shall be manufactured from polycarbonate or a similar ultraviolet stabilised, vandal resistant material. If required, bodies shall be suitable for the mounting of photo cells. Bodies of all luminaries shall be of robust manufacture. Suitable corrosion resistant material shall be used for the body and all accessories, screws, etc.
- Maintenance of luminaries, lamp and reflector replacement shall be performed with ease and no tools should preferably be used. All components shall be designed for use in a 400/231V 50Hz system.
- Overheating of any component shall be avoided by sufficient ventilation and heat dissipation. The maximum lamp wattage shall be permanently marked on the luminar.
- All internal wiring shall be heat resistant and terminate in a suitable terminal block. Circuit wiring shall be protected against heat by heat resistant sleeves of sufficient size for 2 x 4mm² PVC insulated conductors.
- All connections to terminals of components shall be soldered (or tinned for screw type terminals) to ensure good connections.
- The control gear can either be mounted internally or separately (refer to the Project Specification) and shall be designed for that specific luminar.
- Control gear shall not cause any radio or TV interference.
- Lamp holders shall accommodate ES type lamps and be manufactured from porcelain. No vibration shall be conducted to the lamp.
- It shall be possible to adjust streetlights from semi- cut-off to cut-off and vice versa.

- MOUNTING

- The fixing of street lighting luminaries shall be by means of adequately sized grub screws and no movement due to wind, vibration, etc. shall be permitted.
- Street lights shall be suitable for mounting to a bracket or 40mm ø spigot, on top of the pole or on to a cross arm, at an angle of 12,5 degrees with the horizontal. The effect of the mounting angle on lamp life shall be stated by the Tenderer.
- Flood lights shall be suitable for mounting onto a bracket and adjustability in all horizontal and vertical directions shall be possible.

4.5 CONDUIT AND WIRING

- GENERAL

- Only solid drawn or continuous seam welded steel conduit with appropriate fittings in accordance with SANS 162 and bearing the SANS mark shall be used unless otherwise directed by the Engineer.
 - The installation shall form a mechanically robust unit and shall in the case of metal conduit also be electrically continuous, although the conduit installation shall not be depended upon to act as earth continuity conductor.
 - All conduit ends shall be thoroughly reamed and cleared of all sharp edges and burrs. All conduit fittings shall likewise be cleared of sharp protrusions. All conduits ends shall be bushed.
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- Conduit installations whether installed on structure surfaces or in roof spaces, shall be neatly installed parallel to structure surfaces, evenly spaced relative to adjacent conduits or similar installations, and following main structure lines. Conduits shall be neatly supported using purpose made saddles. Fixing of conduit on structures, etc. shall be done at least every 1200mm along straight runs and saddles shall be installed within 100mm from every conduit end and both sides of the bend. Where saddles are fitted to brick, concrete or similar structures only approved purpose made expansion bolts or plugs and screws shall be used.
 - The complete conduit installation shall be such that the pulling in of wiring can be done without damaging the wiring.
 - Conduit in concrete slabs shall be installed as close as possible to the slab centre but shall be recessed at least 30mm from the closest slab surface.
 - All boxes cast into concrete slabs, shall be at least 50mm deep and shall be fixed to the shuttering by means of screws and nuts.
 - In cases of conduit installations in concrete slabs or similar floors, arrangements shall be made by the Contractor to have a person available to effect emergency repairs to the conduit installation should this become necessary during the casting operations.
 - The Contractor shall arrange for the Engineer to inspect all conduit installations prior to the concrete being poured and ceilings installed. The Engineer shall be notified at least 3 working days in advance of such an inspection. All conduit work shall be completed at least 24 hours before the time of pouring.
 - Until wires are installed, all conduit ends will be temporarily sealed to prevent dust, sand, grease, etc. from entering.
 - Conduits installed by the Contractor for subsequent use by others, shall be provided with suitable galvanized draw wires. Black enamel coated conduit and fittings shall be used for installations in concrete structures, brick walls and similar structures.
- METAL CONDUIT
- All metal conduit accessories shall be of malleable cast iron or pressed steel with brass bushes in accordance with SANS 162. Alloy or pressure cast metal accessories or zinc base alloy fittings are not acceptable.
- PLAIN-END METALLIC CONDUIT
- As an alternative to the threaded conduit, plain-end (unthreaded) metallic conduit with accessories may be used under the following conditions:
 - The bending and setting of plain-end conduit must be done with special benders and apparatus manufactured for this purpose and which are obtainable from the suppliers of the system. Damaged conduit resulting from the use of incorrect bending apparatus shall be completely removed and any wiring already drawn into such damaged conduits shall be completely renewed at the Contractor's expense.
 - Screwed conduit must be used in the following:
 - In flameproof installations
 - Load bearing conduit
 - For the suspension of luminaries
 - Surface mounted conduit
 - Plain-end conduit and associated accessories shall be manufactured of mild steel having a minimum thickness of 0.9 mm and shall comply with SANS 1007. Conduit manufactured of lighter gauge material, i.e. 0.7 mm, will not be permitted.
 - All metallic conduit shall be manufactured from mild-steel with a minimum thickness of 1,6mm in respect of screwed and 0,9mm for plain-end conduit except when used in concrete slabs, plain-end conduit shall have minimum wall thickness of 1,2mm and when laid on top of concrete slabs 1,6mm.
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○ NON-METALLIC CONDUIT

- Non-metallic conduit shall comply fully with SANS 950 and shall be installed under the following conditions or if otherwise stated under the Project Specification.
- All non-metallic conduit shall comply fully with SANS 950 and shall be installed in accordance with Appendix C of the same specification as well as par. 5.4.3 of SANS 0142
- A non-metallic wire way system shall not be used:
 - in a location that is declared by the supplier to be unsuitable because of environmental conditions.
 - Where it is liable to be damaged mechanically, unless it is adequately protected from such damage.
 - for enclosing cables that would in normal service operate at temperatures in excess of the maximum temperature specified in the relevant specification for the wire ways;
 - Where it might be subjected to temperatures outside the range of temperatures specified in the relevant specification for wire ways;
 - Where it might be exposed to fumes or gases that will cause abnormal deterioration of the wire way.
- Non-metallic wire way systems shall be installed in accordance with the following procedures and any other procedures recommended by the manufacturer:
- Conduit shall be secured at intervals not exceeding 1 m, except that, if it is inaccessible or unlikely to be disturbed and is supported on a rigid horizontal surface or on horizontal members spaced at intervals not exceeding 1,5 m, it need not be secured. Ducts and trunking shall be secured in accordance with the manufacture's recommendations.
- Wire ways supports shall be such that they allow for expansion and contraction of the wire way.
- When temperature variations of 20°C or greater are to be expected, a straight run of wire way shall be fitted with expansion joints at intervals not exceeding 8m.

NOTE

- Adequate measures shall be taken to prevent ingress of water where this could occur at expansion joints.
 - Various installation procedures for non-metallic conduit are given in Appendix C of SANS 950 (see Appendix I)
 - Conduit may be buried directly in the ground without additional mechanical protection.
 - Couplers shall be used for jointing two lengths of conduit. For the purpose of this requirement, a factory-made belled-out end of a length of conduit shall be deemed to be a coupler provided that bellling-out process does not reduce the wall thickness of the conduit.
 - Conduit shall not be threaded.
 - Insulated heat-resistant boxes shall be used for outlets of totally enclosed luminaries and other fittings where excessive temperatures are likely to occur.
 - Luminaries and other fittings shall not be supported by non-metallic conduit or conduit boxes. These fittings shall be secured to the surrounding structure in a way that is acceptable to the Engineer.
 - It shall be possible to rewire the complete installation in the future without undue difficulty.
 - Non-metallic conduit and fittings shall further not be used under the following conditions:
 - Outside of building (unless protected, or sheltered under eaves)
 - For mechanical load bearing.
 - Where they may be subjected to temperatures below -10°C or above 70°C for prolonged periods.
 - As primary electrical insulation.
 - In areas where they may be subject to mechanical damage.
 - For applications other than those for which they are designed.
 - Exposed conduit may be painted with normal oil or PVA paints, but care must be taken to ensure that the paint used does not contain any component that will soften or have any other detrimental effect on the materials from which the conduit and fittings are manufactured.
 - When any part of a non-metallic conduit system has to be connected to metal equipment or components the fittings and joints manufactured specifically for this purpose must be used. Non-metallic conduit must not be treaded to fit metallic connectors.
 - Conduit of normal size up to an including 25mm may be cold bent by hand provided that the radius of the bend is greater than six times the nominal size of the conduit, and that the external angle of the bend 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.
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- Warm the cold conduit over the length to be bent by rubbing with hands.
 - Select a bending spring which matches the conduit size and insert it into the conduit beyond the point where the bend is required.
 - Bend the conduit slowly with one motion (either with hands alone approximately 1 m apart, or across the knee) to double the required angle, release the conduit and, when its position is stable, withdraw the bending spring (turning it in anti-clockwise direction to reduce its diameter) and gently correct the angle.
 - Install and secure the conduit immediately following bending.
 - All adhesive joints must be made in a clean dry area. The surface of all components to be bonded must be dry and clean.
 - The insertion depth should be marked on the conduit end and the adhesive applied (by means of a soft clean brush) as quickly as possible to the surfaces to be bonded by brushing lengthwise along the conduit, ensuring that a thin coating of uniform thickness is formed. The joint must be made immediately after the application of the adhesive by pushing the prepared parts squarely together with a twisting motion to the full insertion depth. Care must be taken to avoid squeezing adhesive into the cableway and all excess adhesive must be wiped off.
 - A fine-tooth hacksaw should be used to cut conduit to the required length. Each cut end should be square and free from burrs and loose material. When determining the length of 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.
- NUMBER OF CONDUCTORS PER CONDUIT
- Except if stated otherwise in the Project Specification, the maximum number of single-core cables that may be enclosed in any size of conduit shall not exceed the value given in Table 4 of the SANS 10142 section 5 as listed below.
-

1	2	3	4	5	6
Rated area of conductor, mm ²	Conduit sizes, mm				
	Capacity				
	20	25	32	40	50
1	11	16	-	-	-
1,5	9	13	-	-	-
2,5	6	9	17	-	-
4	5	7	14	-	-
6	4	6	10	18	-
10	3	4	8	13	-
16	-	3	5	9	-
25	-	2	3	6	9
35	-	-	2	4	7
50	-	-	-	3	5
70	-	-	-	2	4

- GALVANISED CONDUIT

- Galvanised conduit and fittings, complying with the requirements of SANS 763, shall be used in the following cases:
- In damp areas such as boiler rooms, kitchens, certain plant rooms, etc. where conduit is not recessed in concrete or plastered brick walls.
- In outdoor installations and in coastal areas.
- In areas prescribed in design drawings which form

- EXPANSION JOINTS

- Positions of expansion joints are indicated on the Drawings, where possible, but it is the Contractor's responsibility to ensure that all the necessary expansion joints are allowed for. The number of boxes shall be limited and the same draw box can be used for several circuits.
- Neat cover plates will be fitted to expansion draw boxes in ceilings. Cover plates will be installed prior to the final coat of paint by others.

- WIRING

- No wiring shall be done prior to the completion and clearing of that part of the conduit installation.
- Wiring in conduit installations shall be carried out using PVC insulated stranded copper conductors complying with the requirements of SANS 1507 and 1574 for 600/1000V conductors.
- Lighting circuits shall be wired with 1,5mm², socket outlets with 2,5mm² and heater and water heater circuits with 4mm² unless otherwise specified. All other circuits shall be wired according to the Wiring Code.
- All phase conductors shall be coloured and neutral conductor black.
- No open wiring shall be permissible and only one circuit per conduit shall be allowed.
- Joints in conductors will not be allowed except where conductors are connected in outlet boxes or light fitting outlets for looping to the next outlet. Conductor end shall be properly twisted together before installation into the terminals.
- Conductors of separate circuits, installed in the same conduit or duct, shall be tied together at intervals not exceeding 1000mm.

- PHASE COLORS OF WIRING

- Phase colouring of wires must be in accordance with the SANS 10142 table 6A in Section 5 as amended.
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1	2	3	4	5
Number of PHASE cores	Colour of PHASE cores	Colour of NEUTRAL core	Colour of EARTHING core (if present)	Colour of SPECIAL PURPOSE core (if present)
1	Red	Black	Green/yellow	Orange
2	Red and white	Black	Green/Yellow	Orange
3	Red, White and Blue	Black	Green/Yellow	Orange
4 and more	Any base colour, except green, yellow, and orange with serial numbers (numerical or words)	Numbered as for the phase cores	Green/Yellow	

4.6 OUTLET POINTS AND INSTALLATION

○ GENERAL

- Outlet points, i.e. switches, light points, switched socket outlets, etc., provided in ceiling panels, tiled walls, panelling, etc., shall be installed symmetrically in such surfaces. Unsymmetrical work shall be rejected.
- The mounting height of equipment/outlets, not included in the schedules, shall be verified by the Engineer. Mounting heights shall be measured to the bottom of the box.
- Only steel cover plates with a white baked enamel finish shall be used throughout the installation, unless otherwise specified in the Project Specification.

○ LIGHT SWITCHES

- Light switches shall comply with the relevant SANS Specification, be of the 250V, 15A type, complete with cover plate and shall be of South African manufacture. (Crabtree Lever Switches)
- Samples of equipment and cover plates shall be submitted to the Engineer for approval within 3 weeks of acceptance of the Tender.
- Only one circuit shall be permitted in any switch box.
- Surface mounted light switches shall be of the industrial type.

○ SWITCHED SOCKET OUTLETS

- Switched socket outlets shall comply with the relevant SANS specification, be of the 250V, 15A, 3 pin, safety shutter type, complete with cover plate, and shall be of South African manufacture. (Crabtree Lever Switches) Switch socket outlets shall be of the same manufacture as the light switches.
 - Surface mounted switched socket outlets shall be of the industrial type.
-

- LIGHTING OUTLETS
 - Outlet points shall be interlinked with each other, light switches or distribution boards by means of 20mm diameter steel conduit.
 - Wiring in light fittings shall terminate on suitable terminal blocks, supplied by either the lighting manufacturer or the Electrical Contractor. If required, the earth wire shall be connected to the earth terminal of the fitting by means of a suitable crimping lug.
- MOTOR AND MACHINE POINTS
 - Depending on the size of the motor and the number of phases, a 30A, 60A or 100A 2 or 3 phase isolator shall be supplied next to the motor, motor starter or machine. From the isolator to the motor/motor starter and/or machine a suitably sized 600/1000V PVC SWA PVC cable, complete with glands and shrouds shall be installed. Cable cores shall be furnished with suitable crimping lugs.
- AIR CONDITIONERS
 - A suitable rated single of three pole isolator shall be flush mounted as close as possible (approximately 500mm) from the air conditioner. 20mm conduit shall be used and the final connection shall be by means of 1,5 mm², three or four core "cabtyre" with copper conductors, depending on the number of phases.
- POWER SKIRTING
 - All power skirting shall be of type Cabstrat or O-Line single, double and triple channel as specified in the BOQ.
 - The power skirting must be installed according to a spirit level or according to the floor or ceiling height.
 - Power skirting must be so spaced that a carpet or tile can still be installed below the skirting or otherwise specified on the drawings
 - All holes or access through walls or partitions shall be neatly filled and cleaned.
 - The outlets on the power skirting shall be the same as above mentioned outlets.
 - Network points and isolators shall be supplied with the installation.

5 TECHNICAL INSTALLATION OF REQUIREMENTS

5.1 REMOVAL OF EXISTING SMALL POWER AND LIGHTING

Existing lights, light switches, socket outlets, power skirting and redundant electrical equipment, as specified in the BOQ and which is also room specific, will be removed and replaced with new equipment according to the drawings.

Where possible all the existing positions of the electrical equipment will be used, if existing position is not suitable, new installation will be done according to the drawings.

Where existing equipment is removed and not suitable for the installation of the new equipment, Blank covers will be installed.

5.2 POWER SKIRTING

The Contractor shall be responsible for the supply, delivery and installation of all power skirting complete with corner pieces, end pieces, junction pieces, supply conduits, cover plates and power outlets in position to be indicated on site.

The trunking must not be larger than necessary to achieve a neat unobtrusive appearance, Install the trunking in straight horizontal and vertical lines and close to or on natural building lines.

Fix trunking with expanding anchor nails or bolts, nuts and washers through the back of the trunking, Screws must have rounded head and that will not damage the insulation of the wiring installed in the trunking.

The trunking can covers must be mitre cut at corners and bends. Fit all open trunking end with end-covers.

Install trunking only with the accessories recommended by the manufacturer and install it according to the manufactures instruction

Trunking must not be loaded to more that 60% of their capacity.

All power skirting shall be of type Cabstrut double channel Aluminium Powder coating – Colour – (As specified) (matt textured) .

Aluminium Powerskirting shall be manufactured or extruded in accordance with DIN EN 755-9 using grade 6063-T6 grade aluminium alloy and then powder-coated to SANS 1274:2020 for interior use in non-corrosive environments, on visible surfaces only using a range of aesthetic textured and smooth colours.

Aluminium Powerskirting straight bodies and covers supplied separately in standard 3000mm lengths.

All powerskirting will come complete with covers, end caps, joiner clips, elbows eg. that fits Crabtree sockets.

5.3 SWITCH SOCKET OUTLETS

The Contractor shall supply and install all switch socket outlets in the positions as detailed on the drawings

5.4 LIGHT SCHEDULE

The Contractor shall supply and install all light fittings in the positions as detailed on the drawings.

Light schedule for the building as set out in the light schedule on the Bill of Quantities and the Drawings

5.5 PROVISIONAL AMOUNTS

Provisional sums are allowed in the price summary for the following :

- HVAC – Electrical circuits and isolators

The actual proven cost for the above work will be refunded to the electrical sub-contractor out of the provisional sums in the price summary.

5.6 MAKING GOOD AND/OR CLEANING OF SITE

On completion of each section of the Works, or if directed by the Engineer on completion of any portion of it, the Contractor shall carefully restore to their original conditions the grounds, roads, pavements, lanes, lawns, fences and any structure that may have been interfered with by him or his employees. All surplus spoil resulting from the excavation, rubbish, tools, tackle, plant and material must be removed immediately from each section of the work as soon as it is completed.

Except where specifically scheduled, no extra payment will be made to the Contractor for the restoration of the surfaces, the cost of restoring same will be held to be included in the Contractor's rates for site establishment.

5.7 CERTIFICATE OF COMPLIANCE

The Contractor shall issue an **original** Certificate of Compliance for each installation in terms of the requirements of the SABS 0142.

5.8 TESTING AND INSPECTION

The Contractor shall test the entire installation in terms of Regulation 7 of the Electrical Installation Regulations 1992 of the Occupational Health and Safety Act 1993 and shall issue a Certificate of Compliance on the official form, Annexure 1, obtainable from the Electrical Contracting Board of South Africa. All tests shall be carried out in conjunction with and to the satisfaction of the Supply Authority and in the presence of the Client's Authorised Representative. The Contractor shall make all arrangements for testing and inspection, the costs thereof being included in the Tender Price.

All 230 V socket outlets shall be tested for polarity and the sensitivity of the earth leakage protection equipment shall be tested by means of an approved instrument.

Each length of cable shall be tested for insulation and polarity by means of a 1000-volt megger designed for that purpose. In the case of underground cables this shall be done before backfilling. In addition, the earth-loop impedance of each main and sub-main feed shall be measured.

The earth resistance at each down conductor earth electrode shall be measured. The earth resistance shall be tested by means of an approved instrument.

If there is no power on the day of the test, the Contractor shall supply a 3 kW, 242 V generating plant for testing purposes.

"DANGER" notices shall be displayed at remote ends of cables under test.

The Engineer reserves the right to witness all tests. The Contractor shall advise the Engineer in writing of all results and furnish copies of all certificates.

The Contractor in conjunction with the Engineer shall undertake load balancing. Where conductors are altered to achieve satisfactory results they shall be re-laced by the Contractor.

The Contractor shall provide all the necessary instruments for the proper testing of the complete installation. If there is reason to doubt the accuracy of such instruments, the

Contractor shall take the necessary action to prove their accuracy.

If the results of the first delivery tests are favourable and the installation is found in order, there will be no charge for the test. If the test is found unfavourable a levy of R200, 00 will be charged to the Contractor for each subsequent test. In the form of a variation order omitting such costs from his contract price.

The Contractor shall ensure that the installation is completed in every respect and that there are no major defects prior to notifying the Engineer (in writing) for a first delivery inspection.

The Engineer will accept zero minor defects during the final inspection. Should this number of defects be exceeded at the final inspection then the Engineer will terminate that inspection and request that an additional final inspection be arranged by the Contractor

5.9 SPECIFICATION AND DRAWINGS

The specification and drawings generally show the character and extent of the proposed work, and shall not be held as showing every minute detail of the work to be executed.

Tenderers must ensure that their copy of the specification is complete and that all drawings as listed have been received.

Any discrepancy must immediately be brought to the attention of the Engineer.

5.9.1 CONTRACT DRAWINGS

The preliminary layout and extent of the electrical installation are shown on the drawings, which form part of this document.

The positions of all power-, light- and switch outlets or routes, which may be affected by other services, must be confirmed by the Contractor with the Engineer before placing such outlets.

5.9.2 "AS-BUILD DRAWINGS

The contractor is to prepare the "as-built" paper prints in strict accordance with this specification. These drawings are to be kept in the site office. Retention money

normally due before commencement of the maintenance period will not be released until "as-built" drawings have been prepared to the satisfaction of the Engineer and the Client Representative.

5.10 MAKING GOOD AND/OR CLEANING OF SITE

The successful tenderer will be responsible for making good in all trades of any damage to buildings or other services, which he or his employees may have incurred during the construction of the works.

The Contractor will be responsible for keeping the site clean and tidy and shall remove from the site all rubble and litter resulting from the construction work.