**Stellenbosch Municipality**
**Directorate: Engineering Services**
**Department: Electricity Services**

| ELECTRICITY SERVICES | | | |
|---|---|---|---|
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| Revised by | **Nombulelo Zwane** | Review | **Yearly** |
| Approved by | **Johannes Coetzee**<br>**Manager: Electricity Services** | | |
| Signed by | | **Date** 1/8/2017 | |
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1. Scope....4
1.1. Purpose....4
1.2. Applicability....4
2. Normative References....4
3. Terms, definitions and abbreviations....4
3.1. Terms and definitions....4
3.2. Abbreviations....7
4. Requirements....8
4.1. Responsibilities....8
4.1.1. Consultants....8
4.1.2. Developer/Owner....8
4.1.3. Contractors....9
4.1.4. Employees....9
4.2. Ownership....9
4.3. Subdivision Clearance....9
4.4. Legal....9
4.5. Financial Contributions....10
4.5.1. Connection Fee....10
4.5.2. Bulk Services Contribution....10
4.5.3. System Improvements....10
4.6. Defects Liability....10
5. Procedures....11
5.1. Design Procedure....11
5.1.1. Initial Discussion....11
5.1.2. Design Submission and Acceptance....11
5.1.3. Application....12
5.2. Construction Procedures....12
5.2.1. Temporary Builders Connection....12
5.2.2. Existing Services....12
5.2.3. Program....12
5.2.4. Power Outages and Work Permits....12
5.2.5. Site Meetings....13
5.2.6. Inspections....13
5.2.7. Hold Points....13
5.2.8. Pre-commissioning Tests....13
5.3. Takeover Procedure....14
5.3.1. Notice of Completion....14
5.3.2. Final Inspection and Handover....14
5.3.3. Take Over Certificate....14
6. Design Requirements....15
6.1. General....15
6.2. Network....15
6.3. Design Fundamentals....16
6.3.1. Demand....16
6.3.2. Voltage Drop....17
6.4. Materials....18
7. Installation Requirements....19
7.1. Miniature Substations and substations....19
7.1.1. General....19

7.1.2. Site ..... 19
7.1.3. Clearances ..... 19
7.1.4. Door and Locking facilities ..... 20
7.1.5. Plinth ..... 22
7.1.6. Connections ..... 23
7.1.7. Padlocks ..... 23
7.1.8. Earthing ..... 23
7.1.9. Tests ..... 24
7.2. MV and LV Cables ..... 25
7.2.1. General ..... 25
7.2.2. Safety ..... 25
7.2.3. Compliance with standard specifications ..... 25
7.2.4. Preferred cables ..... 25
7.2.5. Cable installation depth ..... 25
7.2.6. Positioning of cables ..... 26
7.2.7. Danger tape ..... 26
7.2.8. Cable Bends ..... 26
7.2.9. Protective Concrete Slab ..... 26
7.2.10. Handling of Cable drum ..... 27
7.2.11. Excavations ..... 27
7.2.12. Cable Laying ..... 30
7.2.13. Testing of cables ..... 32
7.3. Kiosks ..... 32
7.3.1. General ..... 32
8. Metering ..... 34
9.1 Installation of new and multiple meter points on premises. ..... 34
9.2 Safety seals ..... 36
9.3 Bulk metering ..... 36
9.3.1 Conditions of Supply ..... 36
Taking-Over Certificate ..... 39
List of Defects and Outstanding Items ..... 40
Defects Liability Guarantee ..... 41
Medium Voltage Cable Pressure Test Certificate ..... 43
Low Voltage Cable Insulation Resistance Test Certificate ..... 44
Low Voltage Distribution System Core Continuity Test Certificate ..... 45
Substation Earth Resistance Test Certificate ..... 46
Equipment Earth Resistance Test Certificate ..... 47
Trench Inspection ..... 48
Base Inspection ..... 49
Metering Installations (1 of 3) ..... 50
Metering Installations (2 of 3) ..... 51
Metering Installations (3 of 3) ..... 52
Aplication Standby Generator / Alternative supply

# 1. Scope

## 1.1. Purpose

To ensure that the planning, design, construction, operation, and maintenance in the electrical distribution area of Stellenbosch Municipality are done professionally and consistently in accordance with municipal and legal requirements.

This Directive covers the Department's requirements for all aspects of the electrical network, including financial and contractual responsibilities, procedures and technical requirements.

## 1.2. Applicability

This standard is applicable to the Department as a whole as well as all consulting engineers, developers and contractors.

# 2. Normative References

The following documents contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of publication, the references indicated were valid.

Stellenbosch Electricity By-law (June 2005), as amended

Electricity Act, 1987 (Act 41 of 1987), as amended

Occupational Health and Safety Act, 1993 (Act 85 of 1993), as amended

Engineering Profession Act, 2000 (Act 46 of 2000), as amended

All relevant SANS and NRS standards

All relevant departmental specifications

# 3. Terms, definitions and abbreviations

## 3.1. Terms and definitions

**accredited person**

a person that is registered in terms of the Regulations as an electrical tester for single phase, an installation electrician or a master installation electrician, as the case may be;

**belted cable**

a multi-core cable where a part of the insulation covers each conductor and the rest of the insulation covers the combined cores.

**screened cable**

a cable in which every core is separately encased by a conducting paper layer to ensure that the conductor is surrounded by a radial electric filed when it is energised

**bulk services**

all the primary electrical services to which the network is to be linked

**certificate of compliance**

the certificate that is issued in terms of the Regulations in respect of an electrical installation or part of an electrical installation by an accredited person;

**consultant**

the electrical engineering consultant as appointed by the developer

**consumer**

in relation to premises means:

(i) any occupier thereof or any other person with whom the Municipality has contracted to supply or is actually supplying electricity there at; or

(ii) if such premises are not occupied, any person who has a valid existing agreement with the Municipality for the supply of electricity to such premises; or

(iii) if there is no such person or occupier, the owner of the premises.

**credit meter**

a meter where an account is issued subsequent to the consumption of electricity.

**electrical contractor**

a person who undertakes to perform electrical installation work on behalf of any other person, but excludes an employee of such first-mentioned person.

**electrical engineer**

the electrical engineer of the municipality or any duly authorised official of the Electrical Engineering Services Department as designated by the electrical engineer

**electrical installation**

an electrical installation as defined in the Regulations of the Occupational Health and Safety Act.

**external services**

combination of the bulk and link services

**internal services**

all the services within the boundaries of the subdivision area that is necessary for the establishment of services erven, as well as street lighting

**link services**

all new services necessary to link the bulk services to the municipal network

**low voltage**

the set of nominal voltage levels that are used for the distribution of electricity and whose upper limit is generally accepted to be an a.c. voltage of 1000V (or a d.c. voltage of 1500 V). [SANS 1019]

**medium voltage**

the set of nominal voltage levels that lie above low voltage and below high voltage in the range of 1 kV to 44 kV.

[SANS 1019]

**meter**

a device which records the demand and/or the electrical energy consumed and includes conventional and prepayment meters.

**mass impregnated non-draining cable (MIND)**

A cable of which the surplus impregnated-agent was not removed during production because the cable is non-migrating at the conductor's working temperature.

**municipal official**

any employee of Stellenbosch Municipality Electrical Engineering Services Department.

**municipality**

refers to Stellenbosch Municipality, a municipality established in terms of the law or any legal entity duly authorized by the Stellenbosch Municipality to provide an electricity service within the jurisdiction of the Stellenbosch Municipality.

**notified maximum demand**

contracted maximum demand for a specific period notified in writing by the customer and accepted by the utility as that which the customer requires

**owner**

in relation to premises means the person in whom is vested the legal title thereto.

**point of metering**

the point at which the consumer's consumption of electricity is metered and which may be at the point of supply or at any other point on the distribution system of the Municipality or the electrical installation of the consumer, as specified by the Municipality or any duly authorised official of the Municipality; provided that it shall meter all of, and only, the consumer's consumption of electricity.

**point of supply**

the point determined by the Municipality or any duly authorised official of the Municipality at which electricity is supplied to any premises by the Municipality.

**premises**

any land or any building or structure above or below ground level.

**prepayment meter**

a meter that can be programmed to allow the flow of pre-purchased amounts of energy in an electrical circuit.

**service connection**

all cables and equipment required to connect the supply mains to the electrical installation of the consumer at the point of supply.

**standby supply**

an alternative electricity supply not normally used by the consumer.

**supply mains**

any part of the Municipality's electricity network.

**tariff**

the Municipality*'s* tariff of charges for the supply of electricity.

## 3.2. Abbreviations

| | |
|---|---|
| **Al** | Aluminium |
| **CNE** | combined neutral and earth |
| **Cu** | Copper |
| **ECBSA** | Electrical Contracting Board of South Africa |
| **ECSA** | Engineering Council of South Africa |
| **KVA** | kilovolt ampere |
| **LV** | low voltage |
| **MIND** | mass impregnated non-draining cable |
| **MV** | medium voltage |
| **NRS** | Rationalized User Specification |
| **PILC** | paper insulated lead covered |
| **PVC** | Polyvinyl Chloride |
| **SANS** | South African National Standards |
| **SWA** | single steel wire armoured |
| **XLPE** | cross linked polyethylene |
| **AC** | alternating current |
| **DC** | direct current |

# 4. Requirements

## 4.1. Responsibilities

### 4.1.1. Consultants

a) Shall provide proof of professional registration with ECSA of the person(s) substantially executing the design and supervision of the engineering work.

b) Shall provide proof of the relevant insurance when working on behalf of the Municipality.

c) Shall strictly comply with this directive when designing and supervising the constructing of electricity networks.

d) Act according to generally acceptable ethical standards and in good faith.

e) Inform the Developer/Owner of his/her responsibilities should they not be aware thereof.

f) All exceptions to the directive shall be specifically pointed out in writing in the design documentation to the Electrical Engineer and individually approved by the Electrical Engineer in writing.

g) Shall provide a design specification, site layout (indicating minisub/transformer and metering panel positions), single line diagram and schematic diagrams of all panels to the Electrical Engineer for approval **before construction commences.**

h) Shall provide direction, control and supervise the electrical contractor and arrange for any meetings and/or site inspections with municipal officials if necessary.

i) Shall act as the single point of contact for the development and liaise with the Municipality on all matters regarding the supply.

j) Shall arrange for a final inspection and handover on site once the installation is completed.

k) Shall provide as-built drawings in dxf format not later than one week after final takeover.

l) Shall notify the Contractor formally that no excavation work shall commence until they have applied for way leaves from the various municipal departments.

m) Shall ensure that the Services Agreement is in place where applicable.

n) Shall ensure that energy schedule proposed and approved is compiled with before handover to the municipality.

### 4.1.2. Developer/Owner

a) Shall complete the appropriate application form in full.

b) Shall compile an energy saving schedule.

c) Shall be responsible for the funding, design and installation of the electrical network necessary for the development to the standards approved by the Department as covered in this directive.

d) Shall hand over the electrical network to the Municipality on satisfactory completion for all subsequent operation and maintenance, except where the developer and Municipality sign a written agreement with specific supply conditions.

e) Shall provide a Guarantee and Bank Surety covering the material and workmanship of the installation, which shall be held by the Municipality, for a defects period of one year from the date of formal handover of the electrical network.

f) Shall appoint a Consultant (complying with item 5.1.1a) when the total notified demand is **equal to or exceeding 100 kVA/ or** when a sub-division or new development **exceeds 10 single residential connections**.

g) Shall appoint a Contractor (complying with item 5.1.3a) when the total notified demand is **less than 100kVA/ or** when a sub-division or new development is **10 or less single residential connections.**

h) Shall provide for a mini-substation or substation on the plot, on **the erf boundary** when the notified demand **exceeds 160KVA** or the development necessitates the installation of an additional mini-substation.

i) Shall order a mini-substation or transformer at least 6 months before supply is required.

j) Shall provide 24-hour access to all municipal equipment by mean of municipal bypass switch or as determinded by the municipality. **NO EXCEPTIONS.**

k) Shall ensure that the energy saving schedule submitted and approved, is complied with before hand over the network.

l) Shall ensure that mini-sub and substation is on access from street level **(NOT IN THE BASEMENT).**

m) Shall be responsible for the payment of all relevant costs (bulk levy contributions, connection fees and deposits, etc.) **before any construction works by the Municipality commences.**

n) Shall be responsible for the safety, as employer, of the contractor and consultant.

o) Shall appoint a responsible person for the installation if bulk metering with more than five consumers is required.

### 4.1.3. Contractors

a) Shall provide proof of registration with ECBSA of the person(s) substantially executing the design and supervision of the installation work.

b) Shall provide proof of the registered accredited person who will issue the certificate of compliance.

c) Shall strictly comply with the directive when designing and supervising the constructing of electricity networks.

d) Act according to generally acceptable ethical standards and in good faith.

e) All exceptions to the directive shall be specifically pointed out in writing in the design documentation to the Electrical Engineer and individually approved by the Electrical Engineer in writing.

f) Shall provide a site layout (indicating metering panel positions), single line diagram and schematic diagrams of all panels to the Electrical Engineer for approval **before construction commences.**

g) Shall liaise directly with the Consultant where a Consultant is appointed. Consultant to arrange for all the necessary inspections, site visits, etc.

h) Shall liaise directly with the Electrical Engineer or designated official where no Consultant has been appointed.

i) Shall arrange for way leaves from the various municipal departments before any construction commences and shall arrange with the various departments for the location of services of site.

j) Shall submit to the electrical services department the commencement form before any construction work commences.

### 4.1.4. Employees

It is the responsibility of all employees in the Department of electrical engineering services to ensure that the requirements of this directive are complied with.

## 4.2. Ownership

a) All equipment in the distribution system up to and including the tariff metering equipment shall be the council's property and the council shall be responsible for maintaining the equipment.

b) The exception is the service cable from the erf boundary to the metering equipment, the electrical installation of the building and the wiring to the metering equipment (inside the building) for which the client will take responsibility.

c) In the case of an upgrading, the old/replaced/existing transformer and the mini-substation shall remain the Municipality's property irrespective of the type of upgrading.

## 4.3. Subdivision Clearance

The Department will only issue subdivision clearance once the electrical network has been installed and formal acceptance and takeover of the network by the Department has taken place.

## 4.4. Legal

The Developer/Owner shall be required to enter into a service agreement with the Municipality, which shall include provisions relating to electrical services. This directive , together with any deviations hereto agreed in writing, as well

as all drawings, specifications and reports prepared and submitted, shall form an integral part of such agreement and shall serve as confirmation of the design approach, equipment and material standards, installation methods and procedures that shall apply in respect of the electrical services.

The Municipality will take over the electrical network (excluding streetlights and service connection which remains responsibility of the body corporate) for operational reasons as well as for the purposes of having the clearances (section 31) granted. However the municipality will not be responsible for any damages to the network as a result of, theft, vandalism or damages as a result of construction works. The responsibility will remain with the developer until the units are sold and houses constructed. Should any damages occur to the electrical network before all the units are sold and houses constructed in full, the repairs of the electrical network will be by the developer and for the developer's account.

## 4.5. Financial Contributions

### 4.5.1. Connection Fee

The Developer/Owner shall be responsible for the cost and installation of all internal services for the development. For residential development with single plots or erven, internal services shall be installed up to the erf boundary of each plot.

The individual consumers/owner shall then pay a connection fee to the Municipality at the time of their individual application for supply.

The Developer/Owner shall also be responsible for the cost of all link services to connect the internal services to the existing bulk services network. The Electrical Engineer shall decide during the preliminary discussion whether the link services shall be installed by the Municipality or the Developer's Contractor.

### 4.5.2. Bulk Services Contribution

The Developer/Owner shall be required to pay a contribution for bulk services as calculated using the methodology as approved by the Municipality and using tariffs as shall be adjusted from time to time.

Developer to pay all bulk levy contributions in full before any construction work commences and before any rates clearances are signed (section 31).

### 4.5.3. System Improvements

The Electrical Engineer can at his discretion, negotiate with the Developer/Owner during the initial discussions, any requirements for the upgrading or replacement of infrastructure in the vicinity of the Development, and if necessary the Developer/Owner shall be requested to allow for the additional network additions over and above the requirements of the Development.

These negotiations shall include discussions on cost implications and methods of financing.

## 4.6. Defects Liability

The Developer/Owner shall accept liability for any defects in the completed network for the duration of the agreed defects liability period. This liability shall cover all aspects of the materials and workmanship and shall be covered by the provision of defects liability guarantee and bank surety which will be held by the Department for the duration of the defects liability period.

The value of this guarantee shall equal five percent of the total cost of the network including VAT. The total cost of the network shall be certified in writing to the Electrical Engineer by the Consultant.

The defects liability period shall initially be set for a period of twelve months from the signing of the takeover certificate, but shall be subject to review in the event of major defects.

The bank surety accompanying the defects liability guarantee shall be valid for a period of 18 months from the signature of the takeover certificate, but shall be released on final acceptance of the network after satisfactory completion of the 12 month defects liability period.

# 5. Procedures

## 5.1. Design Procedure

### 5.1.1. Initial Discussion

The Developer/Owner is normally informed by the Municipality during the initial subdivision application or building plan approval process that he/she/they shall be responsible for the design and installation of the electrical network. The Developer/Owner shall appoint an electrical engineering consultant, as per paragraph 5.1.2 (e), at the earliest possible stage.

The Consultant and/or Developer shall approach the Electrical Engineer formally with details of the proposed development and proposed subdivision drawings as soon as possible after appointment. The Consultant is to ascertain from the Electrical Engineer details of any specific design requirements pertinent to the particular development, such as proposed in feed points, available system capacity, preferred substation sites, type of metering, type of metering kiosk, type of streetlights, and any system requirements that need to be incorporated in the design, as well as the Department's standard specifications for materials to be used.

Once this information has been provided, the Consultant shall continue with the design of the electrical network.

In the event of a development such as per paragraph 5.1.2 (f), the Developer shall appoint an electrical contractor at the earliest possible stage. The Contractor shall follow all procedures as for a Consultant, but the Electrical Engineer shall design and install all electrical services up to the erf boundary.

### 5.1.2. Design Submission and Acceptance

On completion of the design of the electrical network, and before the issue of any tender documents, the Consultant shall formally submit the finalised design and tender documents to the Electrical Engineer for perusal and acceptance.

The submission shall include the following:

1. Site layout drawing showing:
    - Minisub/substation position
    - Kiosk, metering panel, streetlights and cable duct positions
    - Routes, sizes and types of medium voltage, low voltage, service connection and street light cables

    Site layout drawings shall have the erf boundaries and roads as background.
2. Single line diagrams for medium and low voltage network.
3. Schematic diagrams of all metering panels.
4. A design report including the following:
    - Confirmation that the design, equipment and installation methods shall comply with municipal requirements.
    - Details of deviations (if any) from this directive together with the reasons for such deviations.
    - Specific aspects of the design or installation that warrant special mention.
    - The anticipated after diversity Maximum demand of the development.
    - A works program.
5. A draft tender document. (where required)

The Electrical Engineer shall approve, in writing, all documentation and drawings within two weeks of the receipt thereof, provided that the design meets all the requirements. The Consultant/Contractor may continue with the issue of tenders and the commencement of work on site **after approval has been received**.

Formal acceptance by the Electrical Engineer shall not relieve the Consultant in any way of his professional responsibility, or the Developer of his obligation to install the electrical services in accordance with this directive.

The Municipality shall not be held responsible for any costs that may be incurred by the Developer/Consultant/Contractor for any work done or materials purchased that was not formally approved by the Electrical Engineer.

### 5.1.3. Application

After discussions have been finalised, the Developer or his/her representative shall complete the formal application form, to enable the Municipality to supply a quotation for the Municipalities portion of the service connection and the bulk services contribution fees payable for the development. The application, shall be accompanied by the energy saving schedule to be implemented to reduce dependency on electrical energy.

## 5.2. Construction Procedures

### 5.2.1. Temporary Builders Connection

Where possible, a single temporary builder's supply will be made available to the Contractors at the Developer's cost.

The builder's supply shall be deemed as a **temporary supply only** and is available in single and three phase up to a maximum of 150A three phase and 80A single phase. Should the builder require more than 150A three phase, then the permanent supply shall be applied for and used on a temporary basis.

The builder's supply shall be metered via a prepayment meter. The prepayment meter remains the property of the Municipality and shall be returned once the supply is removed.

The electrical Contractor shall supply a temporary cabinet to accommodate the main circuit breaker and prepayment meter.

The builder's connection shall have a temporary status for up to **a maximum time of one year only** and shall then be replaced with a permanent connection or removed completely.

### 5.2.2. Existing Services

The Consultant shall notify the Contractor formally that no excavation work shall commence until they have applied for way leaves from the various municipal departments.

The Contractor shall also arrange with this Department to have the existing electrical services located on site.

The Developer shall bear all costs for services damaged by any of the contractors on site and the repairs thereof.

Should any existing services need to be relocated as a result of the development, the cost thereof shall be for the Developer.

### 5.2.3. Program

The Consultant shall notify the Electrical Engineer formally of the civil and electrical works program prior to commencement of work on site. The Electrical Engineer shall then schedule resources for the Department (for any portion of work to be done by the Department) and inform the Consultant, so that the program can be aligned.

Details of all amendments to this program shall be forwarded formally to the Electrical Engineer.

The Consultant/Developer shall allow 4 to 6 weeks for any portion of the construction work to be done by the Department.

### 5.2.4. Power Outages and Work Permits

Any request for a power outage shall be lodged with the Department at least two (2) weeks in advance to enable the Department to notify effected consumers and plan accordingly.

Outages shall be planned in conjunction with the Department to ensure that disruption of power is restricted to an absolute minimum. The applicable fees shall be paid by the Contractor in advance.

A "permit to work" system will apply to the Contractor when working on municipal equipment and the Contractor shall be required to adhere strictly to municipal procedures in this regard.

The Developer shall bear the extra costs should work or inspections need to be held after normal workings hours.

### 5.2.5. Site Meetings

Regular site meetings shall be held between the Consultant and Contractor. The Electrical Engineer shall be formally notified of site meetings, and reserves the right to attend these meetings as deemed necessary. Copies of the minutes of such meetings shall in any event be forwarded to the Electrical Engineer for information.

### 5.2.6. Inspections

The Department reserves the right to visit the site and to observe the construction work as deemed fit, and to this end the Electrical Engineer shall send representatives to carry out ad hoc site visits in order to satisfy himself that all requirements are met.

**These site visits shall not be construed as formal inspections, and shall impose no obligation on the Department with regard to the acceptance of the electrical network, nor detract in any way from the duties of the Consultant with regard to site inspections.**

Copies of manufacturer's detail drawings of mini-substations, switchgear and transformers, kiosks, meter panels, etc. shall be referred to the Electrical Engineer for final approval after approved by the Consultant.

The Electrical Engineer reserves the right to send a representative to inspect equipment to be installed at the manufacturer's premises. The Consultant shall provide at least 48 hours advance notice that equipment is ready for inspection.

### 5.2.7. Hold Points

The Electrical Engineer shall enforce the following hold points:

- Inspection of the earthing arrangement prior to the placing of the minisub base
- Inspection of the minisub base
- Inspection of cable trenches before backfilling
- Pre-commissioning tests

The Contractor shall notify the Consultant and Electrical Engineer at least 24 hours in advance that the base or trenches are ready for inspection.

The Consultant and Electrical Engineer shall perform the inspections and sign off on it.

The Consultant shall inform the Contractor that he has to adhere to these hold points before construction commences.

The Electrical Engineer reserves the right to force the Contractor to redo work or re-open trenches where the hold points were not complied with. **The Contractor/Developer/Consultant shall bear all costs thereof.**

### 5.2.8. Pre-commissioning Tests

The following testing requirements are the minimum that will be acceptable to the Electrical Engineer:

- Medium voltage paper insulated cables — DC pressure tests
- All low voltage cables — Insulation resistance tests
- Earthing — Earth resistance tests

The Contractor shall perform all the necessary tests, as per the applicable SANS standard, under the supervision of the Consultant and record the results and detail on the prescribed forms.

## 5.3. Takeover Procedure

### 5.3.1. Notice of Completion

When the installation is complete, the Consultant shall conduct an inspection with the Contractor to ensure full compliance with Municipal requirements, where after the Consultant shall inform the Electrical Engineer formally of said completion and request a final take over inspection and network commissioning.

The following documentation shall be provided with the notice before the final take over inspection and network commissioning takes place:

- All necessary Certificates of Compliance
- Test certificates of pre-commissioning tests and all required manufacturer's tests
- Operation and maintenance manuals of any special equipment that may have been installed
- Completed performance and defects liability form and bank surety
- "As built" drawings (indicating detail positions of all cables, equipment and duct crossings) shall be provided in electronic format as DXF format computer files. These drawings shall be presented when the final site inspection takes place and checked against actual installed services.

### 5.3.2. Final Inspection and Handover

Once the notice of completion is received and all the relevant documentation verified, the Electrical Engineer shall do a final visual inspection of the network, with the Consultant and Contractor present. Any visible defects shall be repaired/fixed immediately or recorded on a snags list for subsequent attention.

On satisfactory completion of the final inspection, arrangements shall be made for commissioning the network. The Consultant shall carry out all commissioning tests deemed necessary by the Municipality to ensure that the network can be safely connected and energised to the Municipal network.

### 5.3.3. Take Over Certificate

Once the network have been commissioned and have been completed to the satisfaction of the Electrical Engineer, with the exception only of the defects fully detailed on the snags list approved by the Electrical Engineer, the Department shall formally take over the network with full operating responsibility.

Once the network is taken over, the Consultant and Contractor shall have no right to access any part of the installation without making prior arrangements with the Municipality and the "permit to work" system shall apply.

The network shall be taken over by the Electrical Engineer from the Consultant and the event shall be recorded by a formal Take Over certificate, signed in duplicate by the Consultant on behalf of the Developer and by the Electrical Engineer. Once the certificate is signed, the defects liability period will commence, which shall run for a period of one year from the date of the certificate.

Once the defects liability period expires, the Department shall accept full responsibility for the network and return the defects guarantee and bank surety to the developer.

# 6. Design Requirements

## 6.1. General

The Municipality will take formal handover of the electrical network of all developments designed under these guidelines (unless otherwise agreed upon in a written contract), and will be responsible for the operation and maintenance thereof. The design of the electrical network shall therefore comply entirely with the provisions of this directive.

## 6.2. Network

| | |
|---|---|
| Primary Network | 66kV |
| Secondary network | 11kV |
| Low Voltage network | 400/230 V (3 phase 4 wire) |
| Frequency | 50Hz |
| Transformers | 11 000/415 V |
| | Dyn11 |
| | 100 – 1 000 kVA |

## 6.3. Design Fundamentals

### 6.3.1. Demand

| DESCRIPTION | ADMD AT M/SUB LEVEL (kVA) | ADMD AT MV LEVEL IE. AT 11 kV (0.85 COINCIDENCE FACTOR FROM M/SUB LEVEL) | ADMD AT EHV LEVEL IE. AT 66 kV (0.85 COINCIDENCE FACTOR FROM MV LEVEL) |
|---|---|---|---|
| Residential Luxury Class Homes > 250 m². LSM 10 and higher. Could be multi-storey units, generally with air-conditioning and under floor heating, more than one electrical hot water cylinder. | 6 | 5.1 | 4.335 |
| Residential Urban. LSM 7-10. Freestanding residential homes or townhouses (not semi-detached) with one electrical hot water cylinder. | 4 | 3.4 | 2.89 |
| Residential Cluster housing (lower than middle class), Semi-detached townhouses, and flats – all with one electrical hot water cylinder or Urban Residential Class with Solar Water Heater. | 3 | 2.55 | 2.17 |
| Government Assisted Housing or Electrification Housing. Note 3 | 0.8 | 0 | 0 |
| Non-residential ≤ 1000 kVA NMD. Characterised by peak loads during normal business hours and not during residential evening peaks. (Note 1) | NMD x 0.9 (Note 1) | NMD x 0.9 x 0.85 (Note 1) | NMD x 0.9 x 0.85 x 0.85 (Note 1) |

Notes:

1. Maximum Demand applied for (also called Notified Maximum Demand) reduced by application of a 90% co-incidence factor and further reduced by 85% co-incidence factors at MV and EHV levels.

Subject to review and final decision by the Manager of the Electricity Department in case of non-residential loads greater than 1000kVA. The mix with residential loads would be taken into consideration when deciding on the likely MV and EHV impact.

2. ADMD and co-incidence factors based on NRS 034 and SANS 10142 and analysis of typical load profiles of Stellenbosch and Franschhoek obtained during the NRS Load Research Project (by Others).

3. An 11kV design shall be prepared based on the overall town planning requirements for the development in terms of zoning and type of industrial use, with the substation sites and the 11kV network being chosen to best suit this layout

### 6.3.2. Voltage Drop

The voltage drop in the LV distributor is calculated by means of the Herman-Beta algorithm.

The low voltage design shall be based on a maximum calculated voltage variation of ± 10% of the standard voltage at the consumer's point of supply.

The standard nominal voltage, as required by the applicable regulations of the Electricity Act, 1987 (Act 41 of 1987), is 230 V.

As a general guide, the following are typical contributions expressed as a percentage of the standard nominal voltage to the percentage voltage variation at the most remote consumer:

| | |
|---|---|
| MV source | 3 % |
| MV distributor | 3 % |
| Transformer | 2 % |
| LV feeder | 8 % |
| Service connection | 2 % |
| Total | 18 % |

## 6.4. Materials

All materials utilised shall be new, and shall comply with the specifications as contained in the supplements to this directive and the relevant SANS and NRS documentation.

| Supplement | Description |
|---|---|
| A1 | Substations |
| A2 | Transformers 11kV free-standing |
| A3 | Ring main units for type B miniature substations |
| A4 | Miniature Substations Type B |
| A5 | Medium voltage cable |
| A6 | Low voltage cable |
| A7 | Kiosks |
| A8 | Circuit Breakers |
| A9 | Metering |
| A10 | Ready boards |
| A11 | Metering Panels |
| A12 | Street lighting |
| A13 | Access Control |
| A14 | Padlocks and keys |
| A15 | Fencing for substations and mini-substations |
| A16 | Earthing specification |
| A17 | Protective slabs |

# 7. Installation Requirements

## 7.1. Miniature Substations and substations

### 7.1.1. General

The position of the miniature substation shall be indicated on the layout drawing and approved by the Electrical Engineer. An on-site inspection may be required.

### 7.1.2. Site

The Developer shall provide for a mini-sub site on his/her plot, on ground level and facing the adjacent road. The site shall have 24 hours uninhibited vehicular access to the adjacent road. The site shall have a minimum size of 5m x 3.5m and must be enclosed with palisade fencing.

In the event that the Developer chooses to enclose the mini-substation for aesthetic reasons, the enclosure shall be a steel palisade manufactured fence including gate and barrel bolts with a minimum size of 5m x 3.5m, a minimum height of 1.8m.

Provision shall be made for a double door (indoor miniature substation) or gate (outdoor) situated on the road facing side of the site. The room shall be connected to the central cooling system where possible. The room shall be sufficiently ventilated by means of vents on the door, roof and extraction fans where possible. The roof shall be sufficiently insulated.

### 7.1.3. Clearances

The following clearances, as per the figure 1 and figure 2 below shall be adhered too in the event of an outdoor or indoor installation respectively.

**Figure 1: Outdoor Dimensions:**

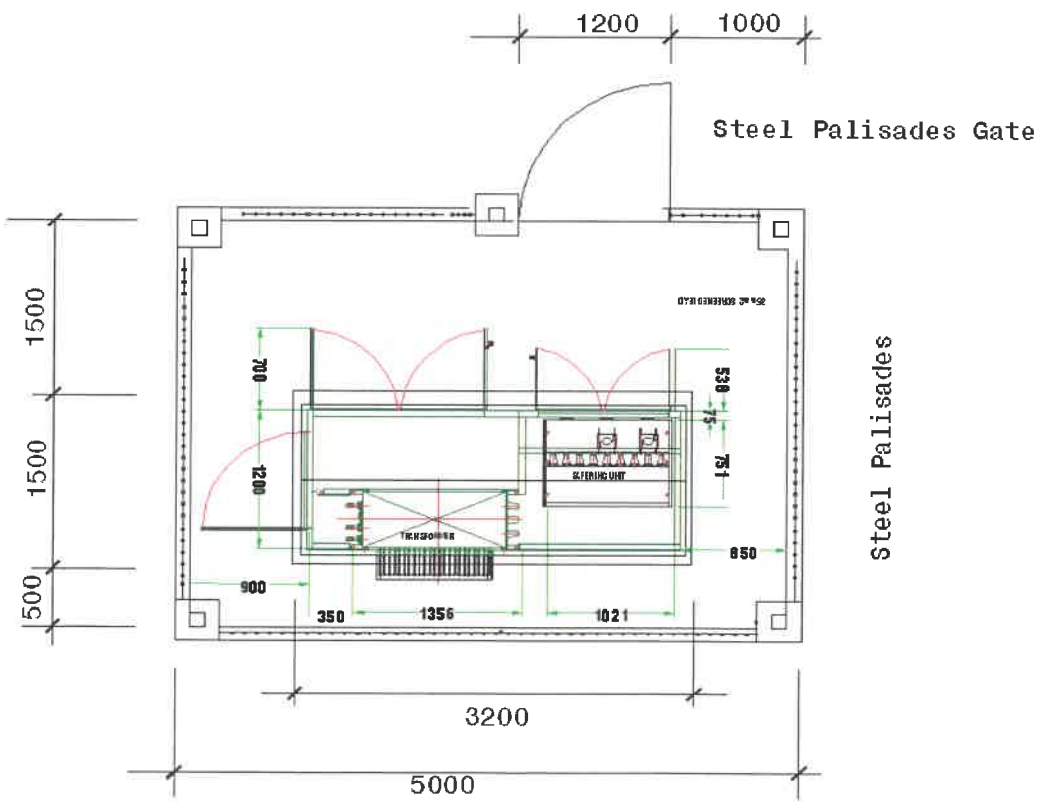
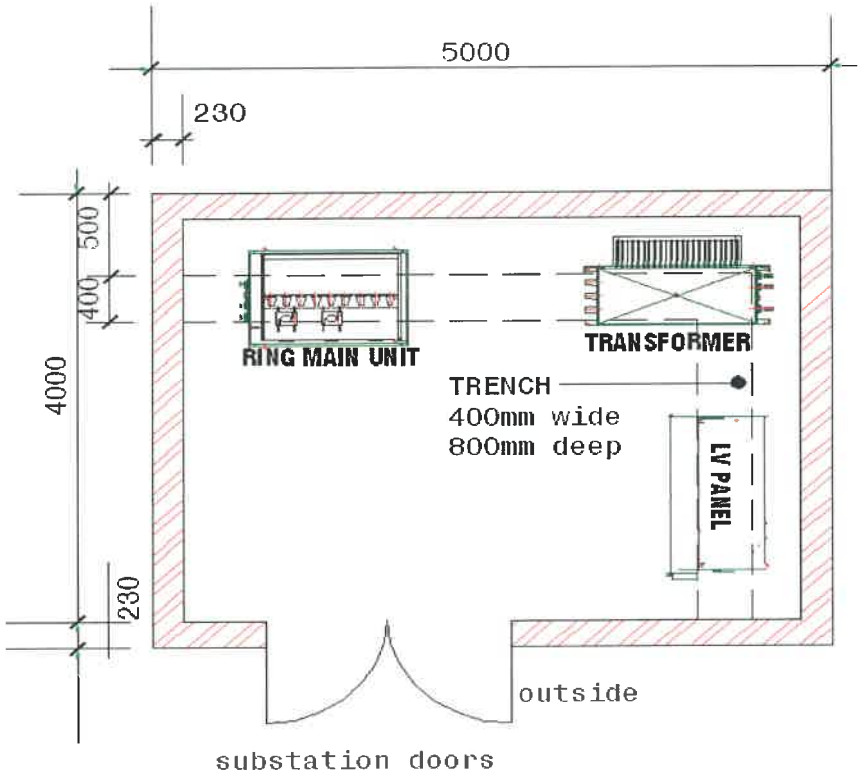


**Figure 2: Indoor Dimensions:**




## 7.1.4. Door and Locking facilities

Steel door shall be installed at every substation building as indicated in figure 3 below.
Two steel doors shall be manufactured of 38mm$^2$ tube steel and must be 2mm in thickness. The locking facility shall consist of 3 off barrel bolts, 2 off mounted on the inside of the left hand side door (one at the top and one at the bottom) and 1 off mounted on the outside in the centre of the right hand side door.
Both doors shall be fitted with swing back hinges to allow an opening radius of 180 degrees. Eyes and hooks shall be mounted on wall and door respectively to prevent door from slamming when open. Pressed louvres (4 sets per door) covered with mesh for vermin proofing shall be provided for ventilation in the substation while the doors are closed. Doors shall be measured to fit, installed with rawl bolts and tack welded and epoxy coated (grey).

All doors for substations and mini-substations (all types) shall be fitted with a vandal proof lock protection cover as indicated in the drawings below (Figure 4 & 5).

**Figure 3: Substation door arrangement**

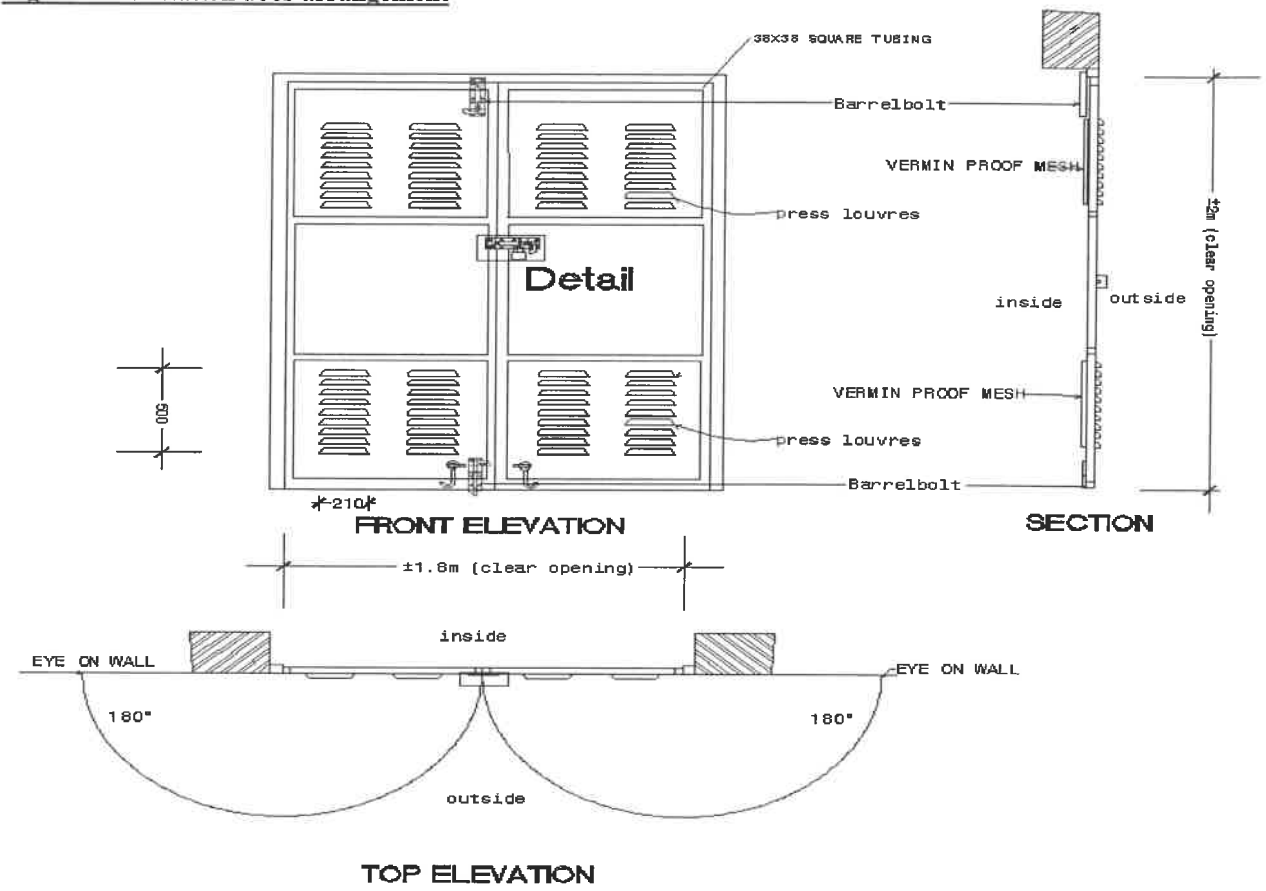



**Figure 4: Lock protector cover for substation doors**

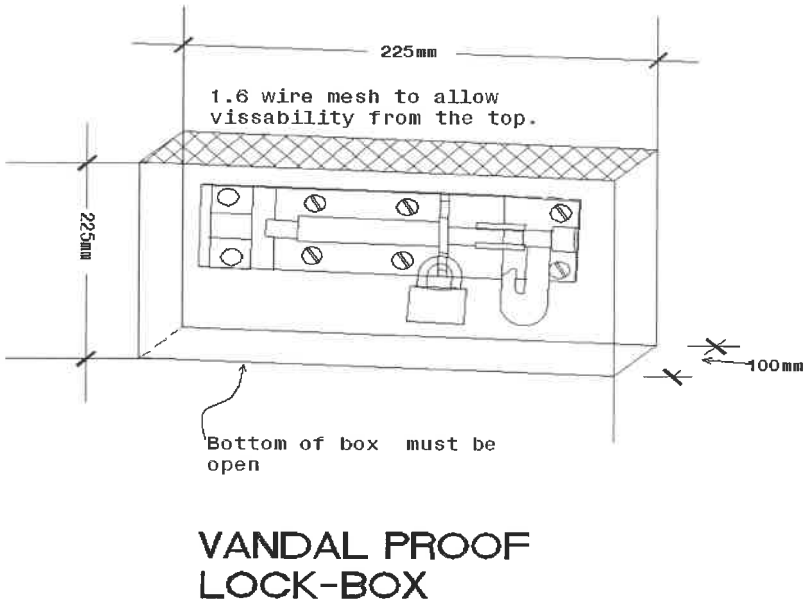
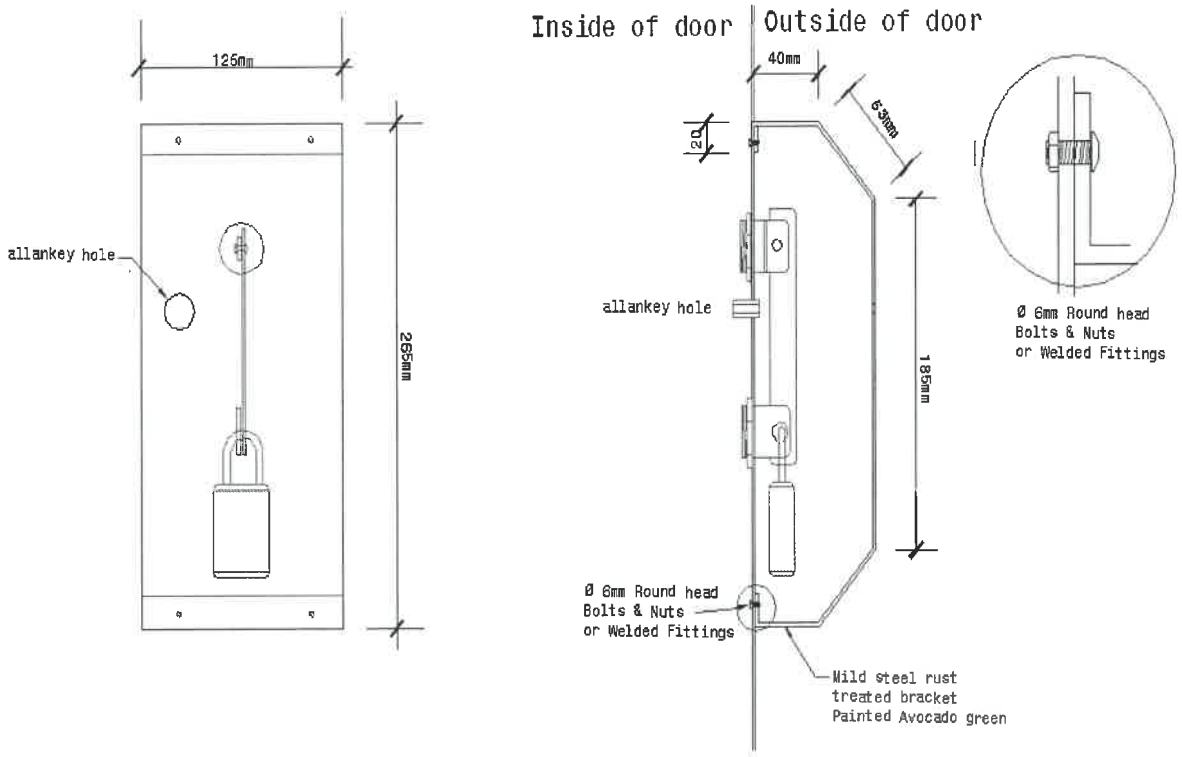


**Figure 5: Lock protector cover for mini-substation doors**




## 7.1.5. Plinth

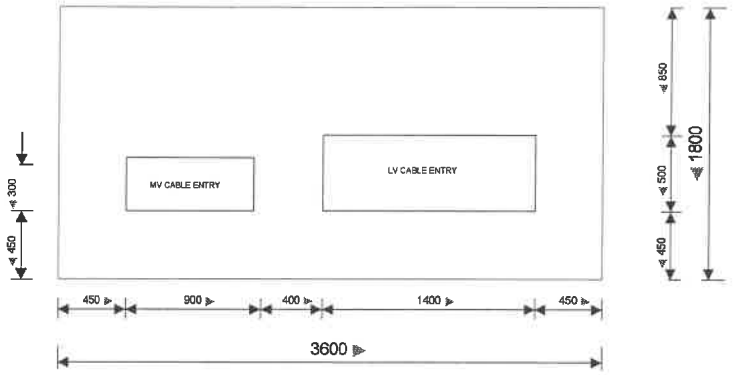
A concrete plinth with measures as per the drawing (Figure 6) shall be cast in such a manner that a 75mm skirt is obtained with respect to the substation base. The plinth shall be a minimum overall depth of 350mm and shall be cast with a minimum of 200mm into the ground and shall protrude at least 150mm above ground level. It shall be placed on a well prepared level and compacted ground. **A pre-approved pre-cast plinth can be used.**

The concrete shall be of a 1:3:5 mix with steel reinforcement and the plinth shall be neatly finished. A hardening period of at least seven days shall be allowed for. The concrete strength shall be 25Mpa.

Where the slope of the site is of such a nature that excavation or backfilling is needed to level the site, a retainer wall will be build to ensure that erosion of the surrounding area does not affect the miniature substation.

Care shall be taken that the plinth is not cast directly above any existing services and if the plinth position coincides with any services, this shall immediately be brought to the attention of the Electrical Engineer or consulting engineer who will advise a new position.

**Figure 6: Suggested concrete plinth**




## 7.1.6. Connections

HV cables shall be rising through the plinth opening from below into the HV compartment where they shall be made off onto the end boxes using compound or heat shrink terminations. Rics boots or equivalent shall be used for terminations.

LV cables shall similarly rise from below and shall be mounted using K-clamps.

Cable access openings below the HV & LV compartments shall be filled with clean sand and top 50mm finished with 10:1 weak sand/cement screed after installation of all cables.

## 7.1.7. Padlocks

Permanent padlocks shall be installed once the installation has been completed and the site is handed over. The contractor shall provide temporary padlocks during the construction period to safeguard equipment.

## 7.1.8. Earthing

All earthing installations shall comply with the NRS 004:2010, section 6 regulations.

min. Four 2,4m M16 earth rods shall be driven into the ground at each corner ~~below the slab before it is east~~ of the mat and connected together to form termination points for the primary earth. Two 100m lengths of 70mm² hard drawn stranded bare copper conductor shall be installed together with the 11kV cable at both termination points where possible and such lengths as necessary to obtain an earth reading of 3 ohm or less. An earth mat 2m x 1m with a 300mm grid (solder or cad weld) shall be installed 0.5m below ground.

A hard drawn stranded bare copper conductor shall be installed between the miniature substation and all kiosks along the LV distribution route. The following sizes earth conductor shall be installed with the respective LV cables:

| LV cable | Earth Conductor |
|---|---|
| 95-185mm² | 70mm² |
| 16-70mm² | 35mm² |

Lugs shall be used by means of acceptable standard onto the earth conductors and connected to the earth bar using brass bolts and nuts. All earth conductors shall rise through the plinth opening as for cables.

### 7.1.9. Tests

The following shall be supplied at final take-over inspection.

Test certificates from the manufacturer for all 11kV switchgear and transformers as per SANS (impulse, temperature rise and short circuit).

Oil test certificates (as per SANS 555) for transformer.

Earthing test certificates shall be supplied at the final take-over inspection.

The following values are applicable:

| | |
|---|---|
| MV only | 1 ohm or less |
| LV only | 10 ohm or less |
| Combined | 3 ohm or less |

## 7.2. MV and LV Cables

### 7.2.1. General

The position of the cables shall be indicated on the layout drawing and approved by the Electrical Engineer. An onsite inspection may be required.

The contractor shall, in conjunction with the consultant, establish if any municipal services exist within the site area and have these services indicated either on plan (way leave) or on site before any construction work commences.

The contractor shall take all the necessary precautions to protect all existing services on site and will be held responsible for all damages to these services, caused by his activities. Should a service be damaged, the contractor shall immediately inform the electrical engineer or municipal department concerned. The contractor **shall not repair** the damaged service, unless he is instructed to do so.

**Please note: A 32mm$^2$ HDPE cable duct shall as a standard procedure be installed with all new 66kV & 11kV cable installations between substations for the future implementation of a fibre optic cable network in the Stellenbosch and Franschhoek area.**

### 7.2.2. Safety

The contractor shall at all times provide proper and adequate precaution and safety arrangements on site in accordance with the Occupational Health and Safety Act. Should the contractor fail to comply with this requirement, the electrical engineer will take the necessary steps to ensure that this requirement is met and any costs incurred will be for the contractor's account.

### 7.2.3. Compliance with standard specifications

The choice, handling and installation of electrical power cables with a rating not exceeding 33kV

| | |
|---|---|
| | SANS 10198-2: 2004 |
| Site clearance | SANS 1200 C: 1982 |
| Earthworks (Small works) | SANS 1200 DA-1A Edition 3: 1990 |
| Earthworks (Pipe trenches) | SANS 1200 DB-rev2: 1989 |
| Concrete (Small works) | SANS 1200 GA Edition 2: 2002 |
| Cable ducts | SANS 1200 LC: 1981 |

### 7.2.4. Preferred cables

Underground installation is the preferred option with cables as follows:

| | |
|---|---|
| MV | Stellenbosch area - 11/11kV 3core Belted Cable Table 18 |
| | Franschhoek Area – 6.35/11kV 3core Screened Cable Table 19 |
| LV | PVC SWA 35 – 185mm$^2$ 4 core |
| | PVC SWA 16 – 16mm$^2$ 4 core for house connections with a split meter |
| | PVC SWA 10mm$^2$ 4 core for low cost housing with split metering |
| Street lighting | PVC SWA 16mm$^2$ 4 core |

Any deviation from the above be pre-approved by the Engineer.

### 7.2.5. Cable installation depth

Cables shall be installed at the following minimum levels below the final ground level:

| | |
|---|---|
| Medium voltage cable | 1000 mm deep on 200mm sand bedding |
| Low voltage and streetlights | 750 mm deep on 150mm sand bedding |

The electrical engineer or his representative shall do an inspection on all trenches before backfilling. The contractor shall arrange for the inspection to be performed. Failure to comply will result in the contractor either excavating inspection holes or re-opening the excavation, and the cost thereof will be for his/her account. PVC warning tape shall be installed 400mm above the cable.

### 7.2.6. Positioning of cables

All electrical cables shall be installed at least 300 mm from any civil, post office or water services.

No electrical cables shall be installed parallel above or below post office or civil services.

No electrical cables shall be installed on the same side of the road as potable water services where possible.

In the case of trenches used for a number of electrical cables the minimum free space between cables required to prevent de-rating of the cables, are as follows:

- Conductor size $< 70mm^2$ 75mm
- Conductor size $\geq 70mm^2$ 150mm

### 7.2.7. Danger tape

Plastic warning tape shall consist of a strip of polyethylene, at least 0.04mm thick and with a nominal width of 230mm. The warning tape shall be totally impregnated with pigment so that it corresponds with colour no B26 (light orange) of SANS 1091:2004 in a reasonable way. A black triangle and the flash symbol for electricity, which corresponds with the sign WW7 of SANS 1186:2003 as well as the words "DANGER, GEVAAR, INGOZI" shall be printed on the full length of the tape with maximum intervals of 1 meter.

Danger tape shall be installed 400mm above all medium and low voltage cables.

### 7.2.8. Cable Bends

Recommended Bending Radius

| **Cable Type** | **Bending radius up to and including 11kV** |
|---|---|
| **Paper insulated cables** | |
| Single core | 20 x d |
| Multi core | 12 x d |
| **PVC insulated cables 1000V** | |
| Multi and single core 16-50$mm^2$ | 8 x d |
| Armoured multi and single core 70 $mm^2$ or greater | 10 x d |

Where d is the diameter over the outer sheath.

### 7.2.9. Protective Concrete Slab

Where protective concrete slabs are required, it shall have the following nominal measurements:

Length: 1440mm

Width: 300mm

Thickness: 40-60mm

The slabs shall be manufactured of 35MPa at 28 days concrete. Each slab shall have two x 3.5$mm^2$ rods. The rods shall be manufactured using mild steel. The protective slabs shall be pre-approved before installation as per the specification.

## 7.2.10. Handling of Cable drum

Cable drums shall be carefully transported to prevent damage to the cables and to prevent disturbing the cables. Always use the appropriate equipment for hoisting of the cable drum. Do not drop the cable drum onto the ground as this not only damages the drum but will damage the cable as well (especially Paper insulated cable).

It is important that rolling of cable drums on the ground is minimised and then only in the direction of the arrows painted on the flanges of the drum. Every drum shall be mounted on jacks or on a cable-drum trailer with a horizontal supporting beam of suitable size and strength to handle the width and weight of the drum. The drum may not be allowed to rotate freely when the cable is rolled off.

The cable shall enter the trench from the top of the reel. All cables ends including that left on the drum or in a trench shall be sealed to prevent the penetration of moisture into the cable. MV cables shall be sealed with a lead cap. The free cable end on the drum shall be fastened to the side of the drum.

## 7.2.11. Excavations

### 7.2.11.1. General

Trench excavations shall comply with the requirements of SANS 1200 LC and SANS 1200 DA. No cables shall be laid before the site is cleaned and the mass earthwork's, which is done by others, is completed.

Trenches excavated close to railway lines, walls, roads, drains, pipes, cables, structures and on similar places where the danger of sagging exists, shall be secured against such dangers using appropriate measures; ensuring compliance with the requirements of the Occupational Health and Safety Act.

In open areas, where long lengths of cables have to be laid, mechanical excavations can be used providing no other services are within the area. When working in the vicinity of other services, manual excavation shall be used.

Where possible a 300mm clear walkway shall be provided at each side of the trench to avoid dislodging excavated material into the trench.

Every trench shall be kept as straight as possible and shall be excavated to approved levels. The bottom shall be level and changes in gradient shall be as gradual as possible.

Excavated material shall be placed along the trench in such a way that it does not obstruct or damage adjacent fences, trees, drains, gate openings and other properties and shall be heaped up in such a way that traffic is not obstructed. Should this not be possible, the material shall be removed from site and brought back later to backfill the trench after the cable(s) has been laid. All surplus material shall be removed once the trench has been back filled.

### 7.2.11.2. Bedding

The bottom of the trench shall be free from loose rocks or stones. It may be necessary to sift excavated soil to achieve this bedding, or even to import a quantity of sand or clay if the excavated material is unsuitable. The depth of this bedding is ± 50 mm after compaction. The use of sand from a riverbed or the seashore is not suitable, as the particles are rounded, and they compact badly. ("Philippi" / "Malmesbury" sand)

### 7.2.11.3. Road crossing

Cables laid under roads or railway lines, shall be laid through sleeves or cableways that are strong enough to withstand the expected shock loads applied by traffic.

For road crossings PVC sleeves shall be used. One 160mm sleeve for each MV cable and one 110mm sleeve for each LV cable. Spare sleeves shall also be provided.

### 7.2.11.4. Back filling and Reinstatement

Every 300mm of backfill material shall be compacted. Once the cables have been laid, and before commencing with back filling, carry out a visual inspection of the installation to ensure that:

- The cables are properly bedded.
- Correct spacing between cables, if there are more than one in the trench.
- Cable entrances at ducts are suitably protected against the possibility of vermin gaining entrance.

- Laying and pulling equipment has been removed.
- That there is no obvious damage to cable sheaths. Up to 90% of the service failures experienced in any cable system can be avoided if appropriate action is taken at this stage.

Suitability of soils for bedding and backfill:

Clay:

Clay is a dense, compact material greasy wet to the touch, which has a low thermal resistivity even in the fully dried-out condition. Most clay's however, shrink when drying and can thus not be used as bedding for a cable. They can be used as backfill and should be consolidated by rolling rather than compacting.

Sand:

Sand is a crumbly material with particle grains easily distinguished and gritty to the touch even when wet. Particle sizes larger than 2mm are known as gravel. Sea sand or sand obtained from a riverbed usually consists of spherical particles and has a very high thermal resistivity when dry. Some quarried sands and man-made sands are used for making concrete, have irregularly shaped particles of varying size and can be compacted to a high density. These can be used as a bedding material especially when 5-10% clay is added and will have a satisfactorily low thermal resistivity in the dried out state sand/gravel mixes should be used with care as sharp particles can damage the cable sleeving.

Sand clay:

Sand clay is, as its name implies, a mixture of sand and clay. It is an ideal material for use as bedding and backfill and is best compacted by rolling. It rarely dries out to lower than 6% moisture content.

Loam:

Loam can vary in colour from reddish brown to dark brown and may contain quantities of organic matter. It crumbles well, even when dry, and can be well compacted to achieve satisfactory values of thermal resistivity, very suitable as a bedding material.

Chalk:

Chalk is a soft white or grey porous material having a lower thermal resistivity when wet, but drying out to very high values and is unsuitable for use as bedding or backfill in any area where drying out is likely.

Ouklip:

Ouklip is decomposed rocky material, varying in particle size and having very low thermal resistivity in the undisturbed state. It can be used as a backfill material when mixed with loam or clay but should not be used as cable bedding.

Peat:

Peat or humus is composed mainly of organic material and is black or dark brown in colour. It should not be used as bedding or backfill as dried out thermal resistivity values of over 4°C m/W are usually obtained. It should be removed and alternative material used for both bedding the cables and for back filling the trench.

Make up soil:

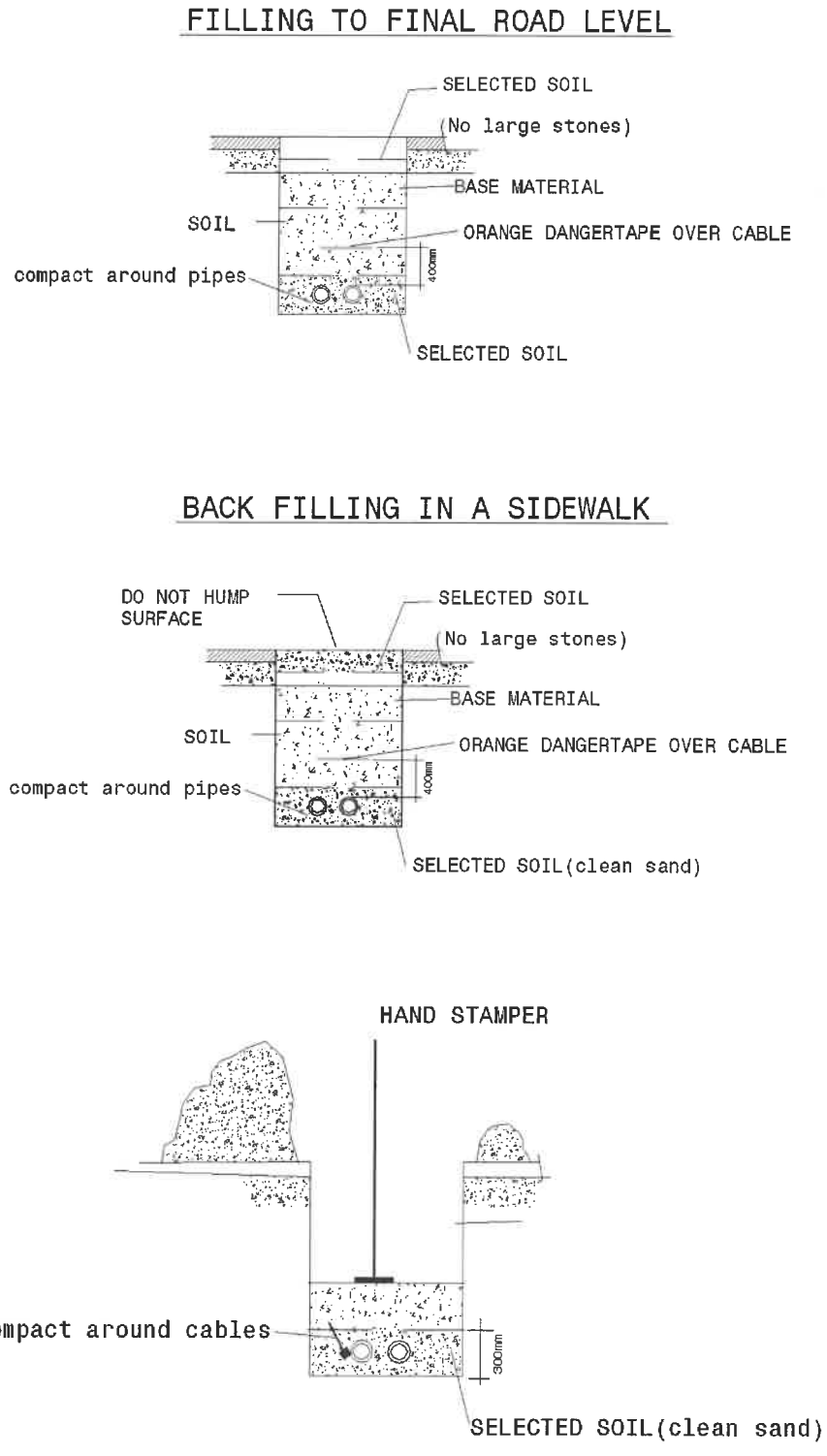
This is a general term for the soil in any area. The level of which has been raised artificially using imported fill which may consist of bricks, concrete, cinders, ash, slag, stones, other refuse or any of the material considered above. If any doubt exists as to suitability, it is best removed completely and a suitable material imported.

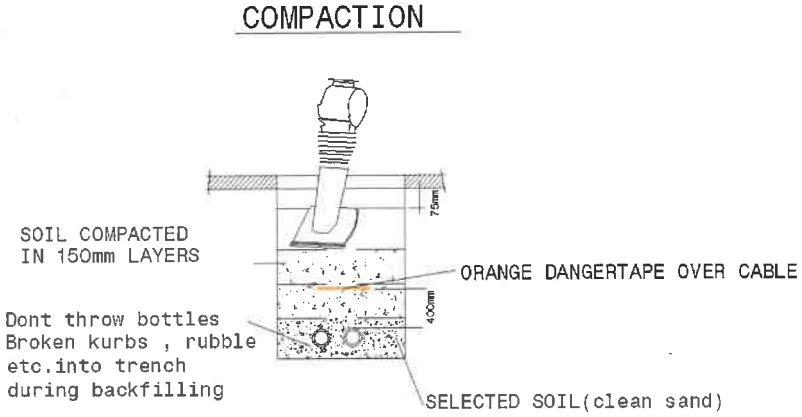
Mine sand:

Mine sand is thermally very satisfactory, but is highly corrosive and should therefore not be used.

If the excavated trench material is suitable for use, the trench can be backfilled and compacted. For the first 50mm of bedding compacting by hand is required, thereafter layers of 150mm can be backfilled and compacted using a mechanical compactor.

**Figure 7: Back filling and Reinstatement procedure**






## 7.2.12. Cable Laying

Preparing for cable laying:

The following "VITAL ACTIONS" must be observed prior to a cable being pulled:

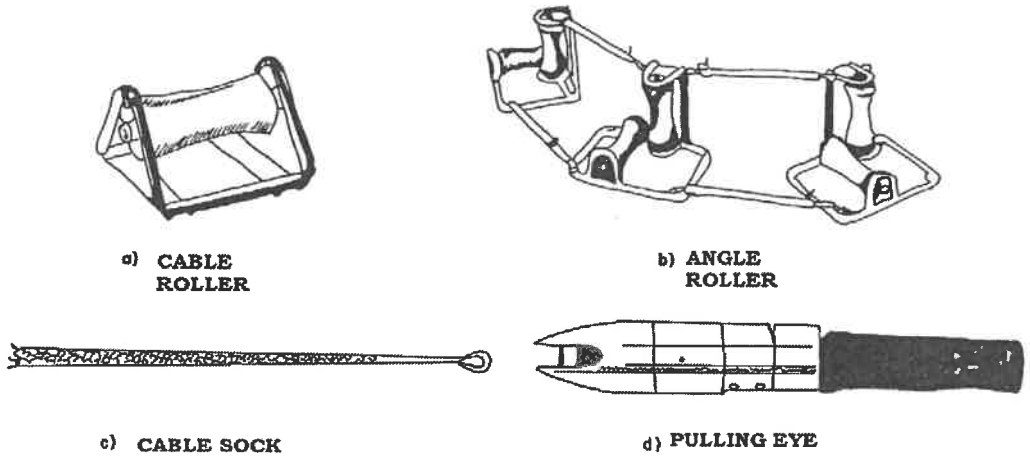
- Cable rollers shall be placed in the trench so that cable is not damaged; to reduce the friction and force required pulling the cable. The cable rollers shall be positioned from between 2m for larger cables to 3 m for smaller cables.
- Ensure that graphite lubricants have been applied where necessary.
- Check that skid plates are secure and in position, corner rollers are a good alternative.
- Ensure that each member of the pulling gang knows exactly what he is to do and that communication signals between members are clear and correct.
- The trench floor must be clear of stones and other obstructions and the cable bedding correctly leveled.

Prior to the cable being pulled:

- Cable covers are available at convenient points to be placed on top of the cable.
- Make sure that any object that may fall into the trench and damage the cable during the pull and prior to back filling has been removed.
- Place the drum at a convenient point prior to the pull on strong jacks and on sound footing (as mentioned earlier) with the arrow on the drum flanges pointing in the opposite direction to the rotation when the cable is being pulled.
- Before pulling, cut the inner end of the cable free.
- Remove the drum battens carefully from the bottom.
- Inspect the cable ends for any sign of leakage (especially Paper insulated cables). If a leak is suspected heating the cap until just too hot to touch can prove it and insulating oil will exude out, the cap should then be removed and the extent of the damage assessed, by means of the dielectric test. Cables with extruded dielectrics should be sealed and kept free from moisture.
- The cable must be pulled off from the top of the drum, but take care not to bend it too sharply.
- Cable pulling stockings should be examined and placed over the nose of the cable with care. The pulling rope or wire must be attached to the stocking in such a way that the cable cap will not be damaged during the pull. The use of swivels is recommended to prevent twisting of stocking.
- One man should remain at the drum and "brake" the drum in order to maintain the correct tension on the cable during the pull.
- Cables should be pulled to its final position in a continuous manner.

- If a winch is being used to pull the cable and unavoidable sharp bends are encountered, a snatch block could be used to assist.
- Immediately after cutting, the cable should be suitably sealed on both ends of the cut to prevent the ingress of moisture. Examine the nose cap and repair any damage that may have occurred during pulling.

**Figure 8: Cable Laying Equipment**



a) CABLE ROLLER

b) ANGLE ROLLER

c) CABLE SOCK

d) PULLING EYE

### 7.2.13. Testing of cables

The following minimum values shall apply when performing the medium voltage pressure testing:

| | |
|---|---|
| Table 18 cables between phases | 31KV dc |
| | 13 KV ac |
| Table 18 cables between phases and earth | 17.9KVdc |
| | 2.7Kvac |
| Table 19 cables between phases and screen | 19KV dc |
| | 13Kvac |

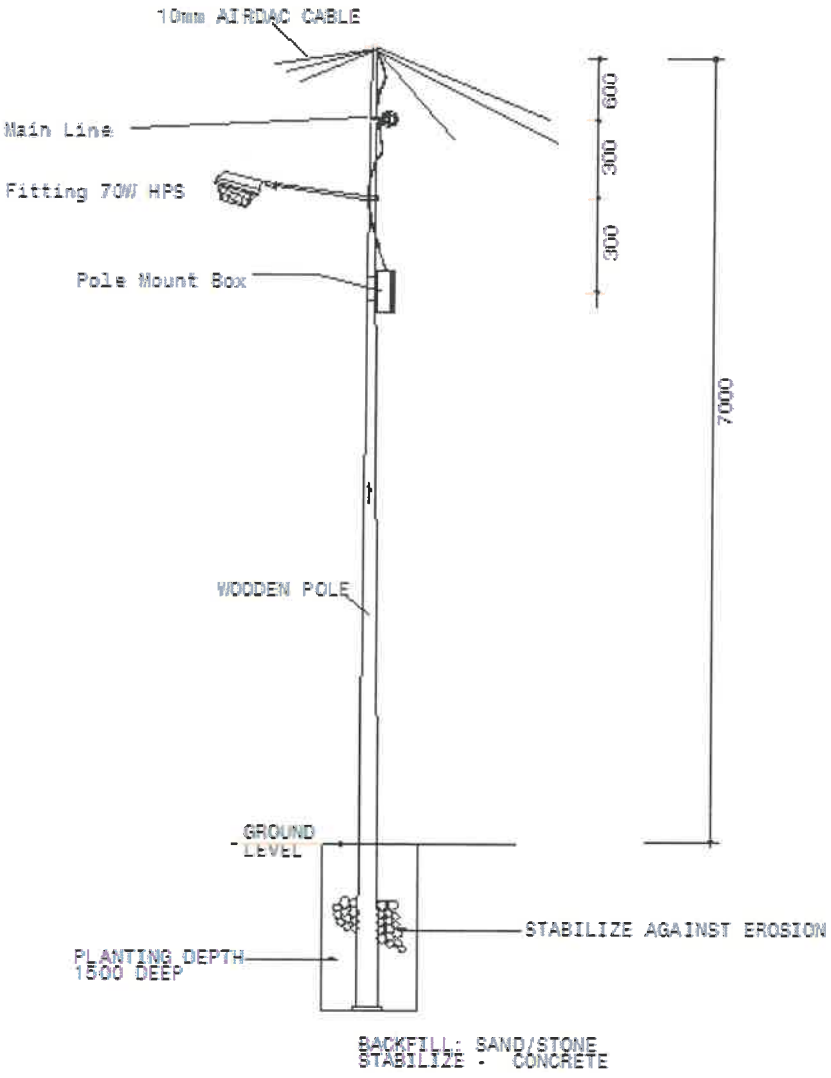
All low voltage cables shall be tested for insulation resistance using a 1000V "megger" (100MΩ).

## 7.3. Kiosks

### 7.3.1. General

The position of all kiosks and meter panels shall be indicated on the layout drawing and approved by the Electrical Engineer. An on-site inspection may be required.

## 7.4 Overhead lines & Services Connections




TYPICAL CROSS-SECTION A-A OF STREETLIGHT

SCALE 1:50
SCALE N.T.S

Drw:Bradley Williams Date 12/02/2016

# 8. Metering

## 8.1 Installation of single end multiple meter points on premises.

The following conditions shall be adhered to for installation of secondary metering to single phase/three phase installations:

- All new metering connections up to and including 80A single phase and three phase will be on a pre-payment basis except national and government institutions.

- RDP and subsidised housing units as well as informal settlements that are limited to 20A shall not get a second meter installed.
- A certificate of occupancy for the second structure must be provided
- The municipal circuit breaker shall be 80A (curve-1; orange toggle); should the applicant apply for a larger supply than currentlly installed, he/she shall be subjected to a bulk levy contribution.
- The applicant shall employ the services of a registered electrical contractor to provide a lockable distribution board of sufficient size to accommodate three (3) single pole circuit breakers; One 80A (curve-1 orange toggle) and two (curve-1 orange toggle) 60A 5kA single pole circuit breakers. This boundary box shall be installed closest to the source of supply and shall be a municipal pre-approved box.
- The boundary box shall be constructed to have two compartments each with its lockable access doors, one for municipal access and the other for consumer access. It shall be equipped with a neutral link to the earth bar in both compartments, curve 1 breakers and meters installed on the municipal side and 60A 5kA white toggle breakers installed on the consumer side.
- A flat complex shall have an enclosure with three compartments which shall have 24 hour access (no keys/security access required). The position of the enclosure shall be pre-approved by a municipality representative and the compartments shall consist of the following:

  **Compartment No. 1** shall house the main breaker, bus bars and metering equipment with maximum demand indication (accessible to municipal staff only).
  **Compartment No. 2** shall be fitted with curve 1 breakers and split meters (accessible to municipal staff only).
  **Compartment No. 3** shall be fitted with curve 2 sub-breakers to the end-users (accessible to end-users)

- The contractor shall provide a Certificate of Compliance (CoC) on completion of the work and before the supply is energised.
- The installation shall be serviced by pre-paid energy dispenser system only.
- The supply cables from the incoming distribution board to the energy dispensers shall be in accordance to item 7.2.4.
- The following panel arrangements shall be adhered to for the installation of multiple metering points (applies to split arrangements as indicated below):

**Figure 10: Split metering panel arrangement (flats)**

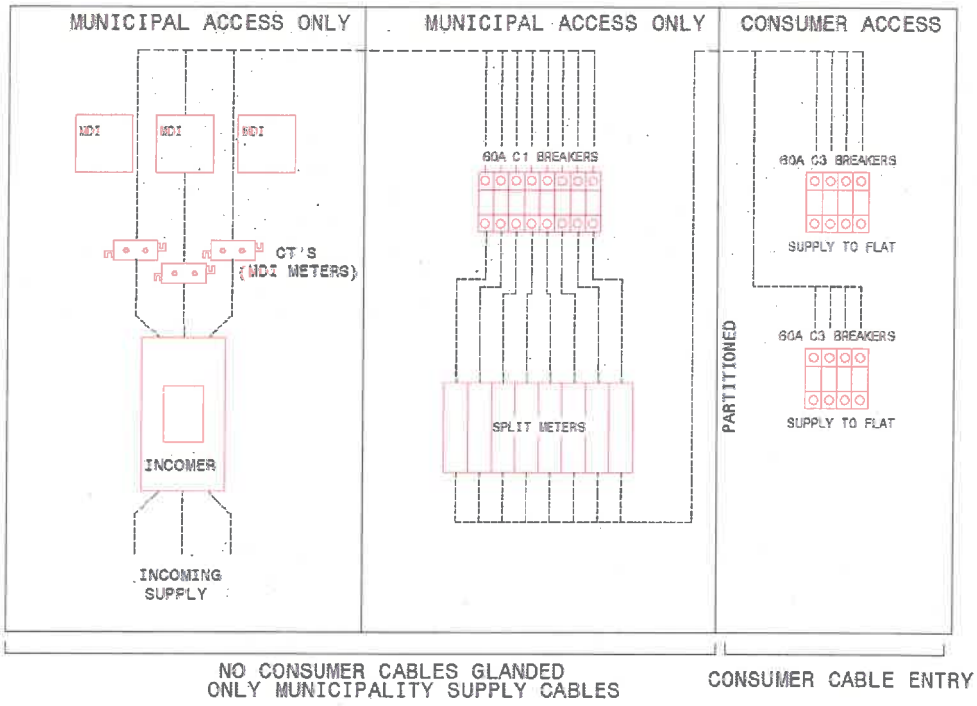
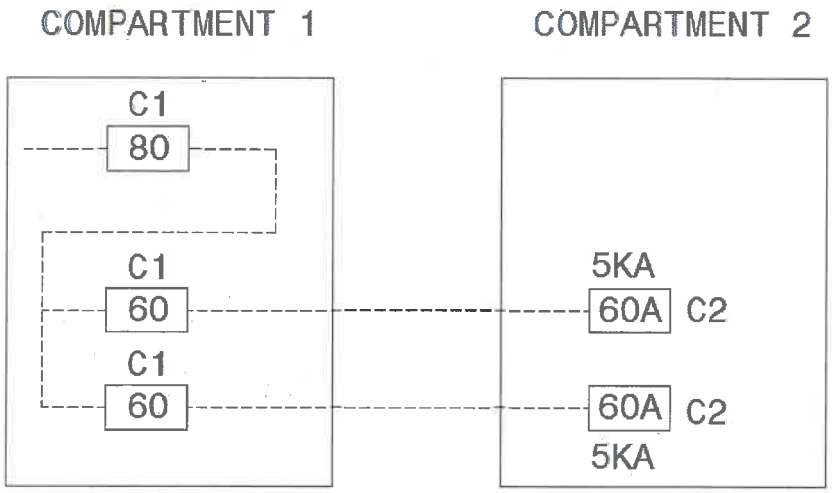



**Figure 11: Panel arrangement for more than one metering supply point to one property**



## 8.2 Safety seals

Seals shall have different colors for different use and shall be utilized as follows:

| COLOUR OF SEAL | DESCRIPTION OF SEAL | DEPARTMENT |
|---|---|---|
| Red | None pay / Instruction from Finance | Finance |
| Blue | New connection (two at meter and two at circuit breaker shroud) | Electrical |
| Red | Temporary off / Residents moved | Finance |
| Clear | Bulk meters / Modems | Electrical |
| Green | Meters audited | Electrical |
| Black | Unsafe | Electrical |

## 8.3 Bulk metering

### 8.3.1 Conditions of Supply

The developer/owner shall ensure that the following procedures have been adhered too prior to the energising of any metering supply by the municipality. FAILURE TO DO SO MAY PREVENT THE SWITCHING OF THE SUPPLY.

- The applicant shall complete the correct application forms in full.
- He/she shall ensure that the full payment for the metering has been made in order for the municipality to supply a meter and the relevant current transformers (for supply in excess of 120 Amperes)
- The client shall **open an account** (new metering) with the municipality to which the monthly bill will be sent. In the case of an upgrading of the supply a deposit shall be paid to the municipality with **no exceptions**.
- A qualified electrician shall be appointed to do the installation.
- The municipality shall have 24 hour access (no keys of security access must be required) to the metering point for maintenance, audits or the recording of monthly readings.
- The client shall ensure that the metering installation complies with the SANS 474: 2006 (NRS 057) requirements and be tested for functionality prior to switching. A commissioning certificate together with a certificate of compliance (CoC) shall be submitted to the municipal engineer or technician at final inspection.

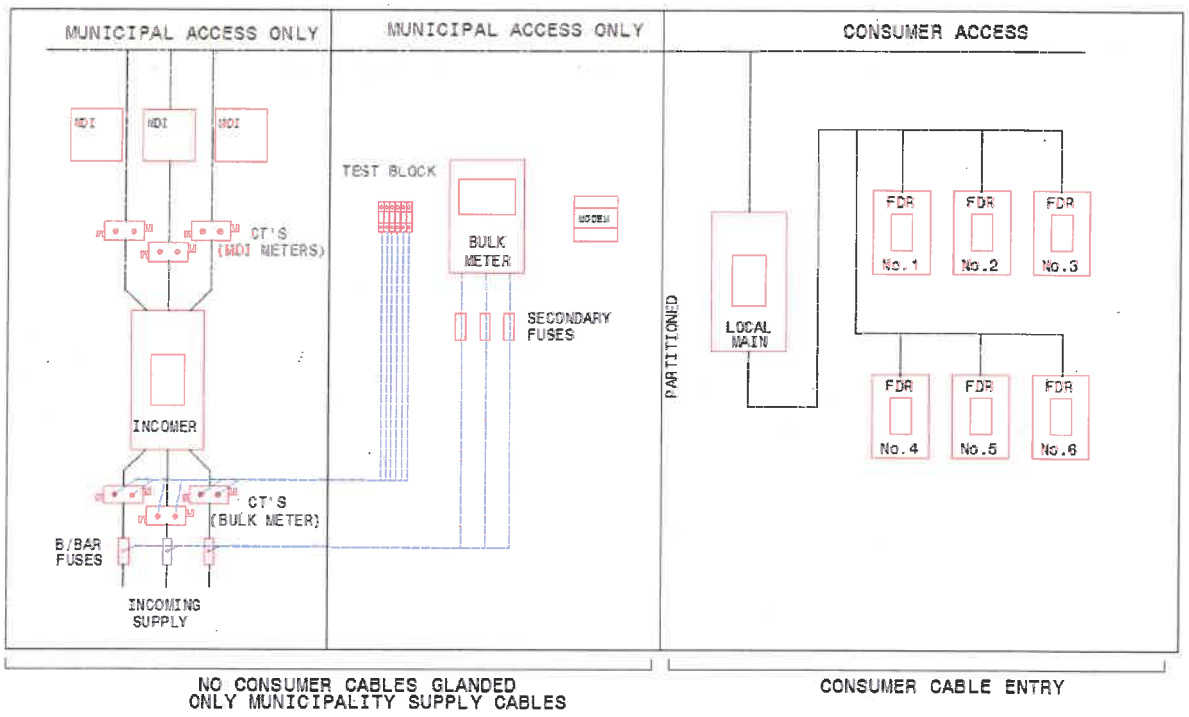
### 8.3.2 Conditions of installation

The following guidelines shall be followed and adhered to with every bulk metering installation.

- The kiosk/metering enclosure shall have a minimum of two compartments - one for municipal access only, the other accessible by the end-user.
- Compartment 1: Main breaker, fuse protection, bulk meter, maximum demand indication, test block, modem and antenna.
  Compartment 2: Fitted with sub-breakers for end-users.

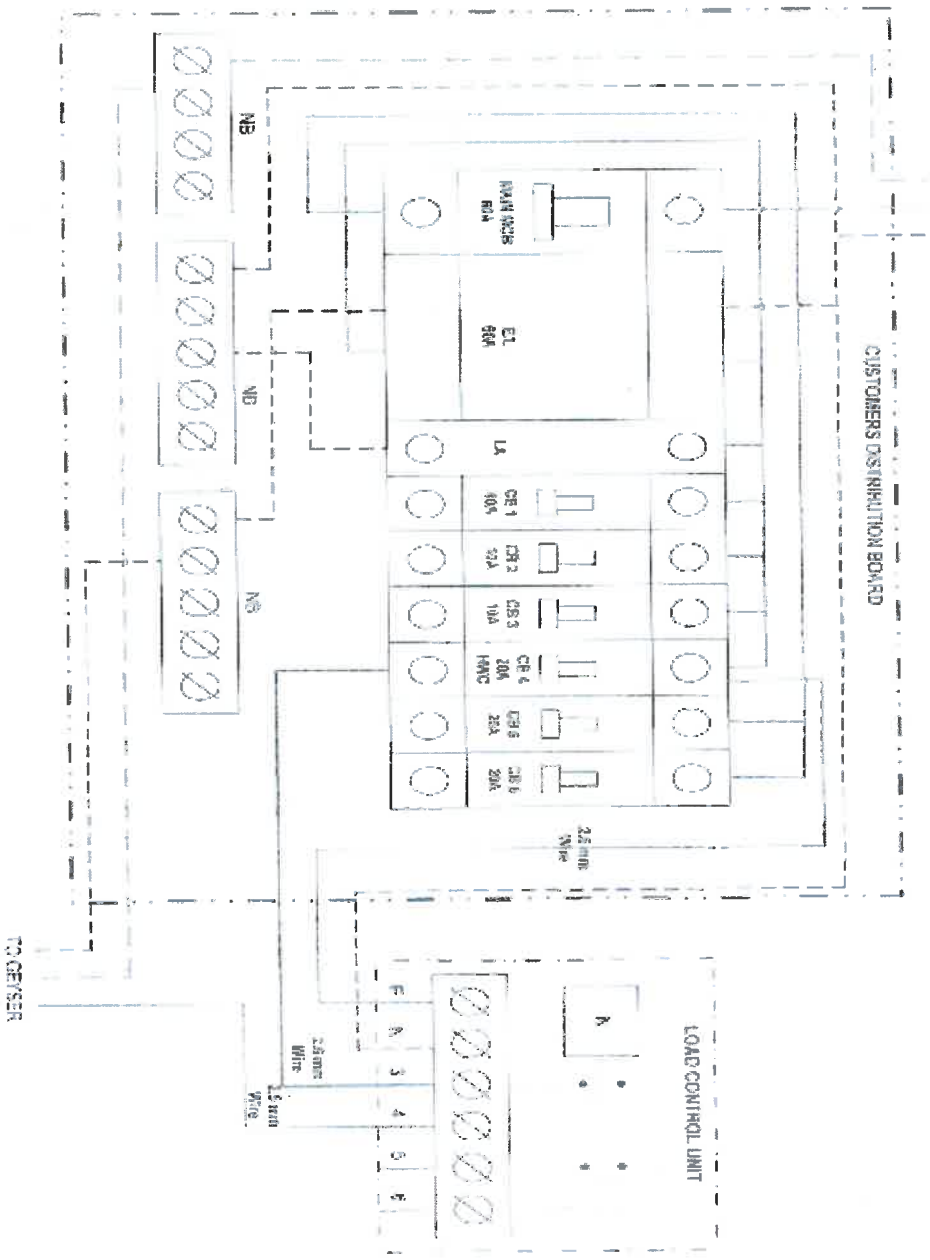
- The meter, modem + antenna, current transformers and test block shall be issued by the municipality by quotation only and shall be supplied subsequent to the full payment made to the municipality.
- The meter shall be wired by the contractor complete with modem and test block

**Figure 9: Bulk metering panel arrangement (businesses)**



# 9 ACD Connections

WIRING DIAGRAMFOR GEYSER CONTROL DEVICE




Does your offer comply with specifications?

YES / NO please encircle

# Annexure A
# Taking-Over Certificate

Development Name: .....

Brief Description of Works: .....

.....

.....

I hereby certify that the above Works, which have been designed and installed in accordance with the requirements of Stellenbosch Municipality, have been inspected and tested by ourselves and are deemed complete for all practical purposes and ready for taking over by the Department Electrical Engineering Services.

These Works are subject to a 12 months defects liability period, which shall commence on the date of signature of this Taking-Over Certificate, and shall expire on:

.....

A Defects Liability Guarantee in the sum of five percent of the total contract value has been lodged with the Department in this regard.

Attached hereto is a list of all the defects and outstanding items that still require the Contractor's attention, which shall be rectified within 14 (fourteen) days from the date of signature hereof. Failure to attend to these defects and outstanding items within this period shall result in the extension of the defects liability period by a period equivalent to the period that these items remain overdue.

Full operational responsibility for these Works shall pass to Stellenbosch Municipality on signature of this Taking-Over Certificate, and no further work, whether to attend to the detailed defects and outstanding items or to rectify any other defects that may arise during the defects liability period, shall take place on these Works by the Contractor or any other person not in the employment of the Department after this date, unless he/she is in the possession of a permit issued by the Department detailing the specific work and it's period.

Any further defects that may arise during the defects liability period shall be reported by the Department to the Consultant, who shall arrange for the corrective action to be taken by the Contractor.

**Signed**

**On behalf of Contractor** .....

**Name in print** ..... **Date:** .....

**Signed**

**On behalf of Consultant** .....

**Name in print** ..... **Date:** .....

**Signed**

**On behalf of Stellenbosch Municipality**

.....

**Designation** .....

**Name in print** ..... **Date:** .....

**List of Defects and Outstanding Items**

# Annexure B
# Defects Liability Guarantee

We, the undersigned,

.....
(Company Name)

Being the Developer of the site situated at .....

And herein represented by.....
(Print Name)

he/she being duly authorised by the owners, hereby certify that the total final contract value of the electrical reticulation designed and installed at our cost at the above site is R.....

We hereby guarantee this electrical reticulation against any latent or patent defects in materials, equipment or workmanship for a period of twelve (12) months from the date of formal take-over of the electrical reticulation by Stellenbosch Municipality. In the event of any defects in this electrical reticulation becoming apparent, the defects shall be reported to our Electrical Consulting Engineer,

.....

who shall take the necessary steps, in coordination with the Department, to have these defects rectified to the satisfaction of the Department Electrical Engineering Services.

We attach hereto a Deed of Surety ship in the sum of R....., which is five per cent of the abovementioned final contract value, in favour of Stellenbosch Municipality, and hereby agree that Stellenbosch Municipality shall be entitled to call in this Suretyship in the event that any defects identified are not rectified to the satisfaction of the Department Electrical Engineering Services within a reasonable and mutually agreed period after notification to our Electrical Consulting Engineer of these defects.

We agree that this Suretyship shall be valid for a period of eighteen (18) months from the date of signature of the Taking-Over certificate by our Electrical Consulting Engineer and the Department's Authorised Representative.

We further agree to accept service of all notices and other documents in connection with this agreement through the ordinary post if the same are addressed to us at:

.....

.....

.....

.....

Signed at.....

on the.....day of .....20.....

Signature .....

Print Full Name .....

Witnesses Print full Names

1) ..... .....

2) ..... .....

Accepted on behalf of Stellenbosch Municipality

Signature .....

Print Full Name .....

on the.....day of .....20.....

# Annexure C

## Medium Voltage Cable Pressure Test Certificate

### TEST CERTIFICATE
### MEDIUM (11 kV) VOLTAGE PILC CABLE: PRESSURE TEST
*To be tested in accordance with SANS 97:1999 TABLE A.2*

Project _____

Location _____

**Pressure Test Equipment**

Make _____ Model _____

Serial Number _____

**Cable Details**

Cable Route

From _____ To _____

Cable Size and Description _____

**Test Results**

| Phases to Earth | Test Phase | Test Voltage (kV dc) | Test Period (Minutes) | Leakage Current (mA) |
|---|---|---|---|---|
| Red - White - Sheath - Earth | Blue | | | |
| Red - Blue - Sheath - Earth | White | | | |
| White - Blue - Sheath - Earth | Red | | | |

**Comments** _____

**Test performed by**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

**Test accepted by (Consultant or Municipality Representative)**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

# Annexure D

## Low Voltage Cable Insulation Resistance Test Certificate

### TEST CERTIFICATE
### Low Voltage Cables: INSULATION RESISTANCE TEST

Project _____

Location _____

**Insulation Resistance Test Equipment**

Make _____ Model _____

Serial Number _____ Voltage _____ kV

**Test Results**

| Cable Detail | Cable Route | | Insulation Resistance | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cores/Size | From | To | R-E | W-E | B-E | R-W | W-B | B-R | R-N | W-N | B-N |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

**Comments** _____

_____

_____

**Test performed by**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

**Test accepted by (Consultant or Municipality Representative)**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

# Annexure E

## Low Voltage Distribution System Core Continuity Test Certificate

### TEST CERTIFICATE
### Low Voltage Cables: CORE CONTINUITY TEST

Project _____

Location _____

**Core Continuity Resistance Test Equipment**

Make _____ Model _____

Serial Number _____ Scale _____

**Test Results**

| Cable Detail | Cable Route | | Core Resistance | | |
|---|---|---|---|---|---|
| Cores/Size | From | To | R-N loop | W-N loop | B-N loop |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Comments _____

_____

_____

Test performed by

Name _____ Company _____

Signature _____ Date _____

Test accepted by (Consultant or Municipality Representative)

Name _____ Company _____

Signature _____ Date _____

# Annexure F

## Substation Earth Resistance Test Certificate

### TEST CERTIFICATE
### Substation: EARTH RESISTANCE TEST

Project _____

Location _____

**Test Equipment**

Make _____ Model _____

Serial Number _____ Scale _____

**Test Results**

Earth Electrode Type

Earth Mat ☐ Trench Earth ☐ Earth Spike ☐

| Sub-/Minisub station | Location | Resistance |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**Comments** _____

_____

_____

**Test performed by**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

**Test accepted by (Consultant or Municipality Representative)**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

# Annexure G

## Equipment Earth Resistance Test Certificate

### TEST CERTIFICATE
### Equipment: EARTH RESISTANCE TEST

Project _____

Location _____

**Test Equipment**

Make _____ Model _____

Serial Number _____ Scale _____

**Test Results**

Earth Electrode Type

Earth Mat ☐ Trench Earth ☐ Earth Spike ☐

| Type of Equipment (Kiosk/Pole) | Location | Resistance |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

**Comments** _____

_____

_____

**Test performed by**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

**Test accepted by (Consultant or Municipality Representative)**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

# Annexure H

# Trench Inspection

## INSPECTION CERTIFICATE
## TRENCH INSPECTION

Project _____

Location _____

**Trench Requirements**

Trench route correct according to drawings

Sufficient safety barriers installed along route and barricading where necessary

Trench Depth Correct

**Inspection Results**

| Cable Detail | Cable Route | | Inspection | |
|---|---|---|---|---|
| Cores/Size | From | To | Pass | Fail |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Comments** _____

_____

_____

**Inspection performed by**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

**Inspection accepted by (Consultant or Municipality Representative)**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

# Annexure I

## Base Inspection

### INSPECTION CERTIFICATE
### BASE INSPECTION

Project _____

Location _____

**Base Requirements**

Base location correct according to drawings

Base correctly installed

Base level with road surface

**Inspection Results**

| Minisub Station Name | Location | Inspection | |
|---|---|---|---|
| | | Pass | Fail |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Comments** _____

_____

_____

**Inspection performed by**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

**Inspection accepted by (Consultant or Municipality Representative)**

**Name** _____ **Company** _____

**Signature** _____ **Date** _____

# Annexure J

# Metering Installations (1 of 3)

Stellenbosch
Municipality
Electricity Department
P.O.Box 17
Stellenbosch
Municipality

7599

Tel:(021) 808 8300
Fax:(021) 883 3242 or
808 8304

Standards and specifications
SANS10142-1:2003
NRS 057:2005

## COMMISSIONING SHEET FOR METERING INSTALLATIONS

### Customer Details

Customer/Business Name

Address

ERF

Contact Person

Tel  Fax  Cell

### Electrical Contractor

Company Name

Contact Person

Tel  Fax  Cell

Experience in metering installation  Years

What metering installation category are you?(see Annex C.1 of NRS 057:2005)

# Annexure J

## Metering Installations (2 of 3)

**Select Appropriate Box**

○ New supply

| Demand | | Amperes |
|---|---|---|

○ Upgrade

| From | | Amperes |
|---|---|---|
| to | | Amperes |

○ Temporary Supply

| Demand | | Amperes |
|---|---|---|

○ Single Phase ○ Three Phase

Purpose for which premises are to be used

○ Domestic ○ Commercial ○ Industrial

Account no. _____

**Electrical Measurements**

Insulation resistance 1M ohm min.(see.8.7.8 of SANS10142-1:2003)

| | | | | | |
|---|---|---|---|---|---|
| Red-White phase | | MΩ | All phases-Neutral | | MΩ |
| Red-Blue phase | | MΩ | All phases-Earth | | MΩ |
| White-Red phase | | MΩ | | | |

**Wiring** Make a tick if done

| | |
|---|---|
| Check of completeness & functionality of devices | |
| Check for correct fuse links in fuse holders(preferred fuses 6A) | |
| Check bus bars and wiring | |
| Check circuit breakers | |
| Check of correct phase sequence | |

**Panel**

| | |
|---|---|
| Manufacture of metering panel | |
| Enclosure type | |
| Wire size | |

# Annexure J

## Metering Installations (3 of 3)

**Fuses**

| | |
|---|---|
| Manufacture | |
| Type | |
| Rating | |
| No. of fuses | |

**CT Details** Applicable to CT connected meters only

| | |
|---|---|
| Phase A | |
| Ratio | |
| Class | |
| Ser No. | |

| | |
|---|---|
| Phase B | |
| Ratio | |
| Class | |
| Ser No. | |

| | |
|---|---|
| Phase C | |
| Ratio | |
| Class | |
| Ser No. | |

**VT Details**

| | |
|---|---|
| Phase A | |
| Ratio | |
| Class | |
| Ser No. | |

| | |
|---|---|
| Phase B | |
| Ratio | |
| Class | |
| Ser No. | |

| | |
|---|---|
| Phase C | |
| Ratio | |
| Class | |
| Ser No. | |

**Meter**

| | |
|---|---|
| Meter Type | |
| Serial No. | |
| Voltage Rating | |
| Current Rating | |
| | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Connection | 3P3W | | 3P4W | | | 1P2W | |

**Remarks**

STELLENBOSCH
STELLENBOSCH • PNIEL • FRANSCHHOEK
MUNISIPALITEIT • UMASIPALA • MUNICIPALITY

INNOVATION CAPITAL

# APPLICATION
# ENGINEERING SERVICES / ELECTRICAL DEPARTMENT

***The applicant must conduct and submit, as part of the application a noise impact assessment in accordance with SANS 10328 to establish whether the noise impact rating of the proposed activity exceeds the appropriate level of noise for the particular area as indicated in SANS 10103***

## SECTION A

NAME OF APPLICANT: _____

PHISICAL ADDRESS: _____

_____

CONTACT DETAIL: _____

ERF NO: _____

## SECTION B (1)

CONTRACTOR/ ACCREDIT PERSON: _____

CONTRACTOR REGISTRATION/ ACCREDITED PERSON CERTIFICATE NO: _____

SIGNITURE: _____ DATE: _____

## SECTION B (2)

PROFESSIONAL ENGINEER/TECHNOLOGIST:
*(FOR SOFT RECONNECTION FUNCTIONALITY)* _____

REGISTRATION NO: _____

SIGNITURE: _____

TELEPHONE NO: _____

_____

EMAIL ADDRESS

## SECTION C

| | | √ |
|---|---|---|
| Mode Of Standby Generation: *(Tick Appropriate Box)* | Portable generator (Complete Section B, C & E | |
| | Permanently installed standby generation that is interfaced with the consumer electricity installation. (Complete all sections | |

| | | |
|---|---|---|
| Construction Schedule: | Construction start date | |
| Type of Energy Conversion:<br>e.g Synchronous Generator, Induction Generator, Inverter, Fuel-cell, Dyno set. | | |

| | | | | |
|---|---|---|---|---|
| Fuel: | Type | | Capacity | |

| | | √ |
|---|---|---|
| Site Plan: | Site Plan to show scaled map with existing services | |
| | Future site development plans | |

| | |
|---|---|
| Land Use Zoning: | |
| Preliminary Design: | Design showing generators, transformers, customer circuitry interfacing with Stellenbosch Municipality electrical network, isolating devices, protection schemes, operating characteristics, etc |
| Total Capacity of Standby Generation (KVA and PF): (Attached schedule for each unit if more than one generation unit) | Design showing generators, transformers, customer circuitry interfacing with Stellenbosch Municipality electrical network, isolating devices, protection schemes, operating characteristics, etc. |
| Make and model of generating unit/s | |

| | | |
|---|---|---|
| Protection Details: | Method used by interlocking mechanism to prevent parallel operation with Stellenbosch Municipality distribution network, electrical and mechanical, break-before-make interlock required for generators that are interfaced with the consumer electrical installation. | |
| | Circuit diagram of standby/portable generator including all interlocking with the Municipal grid, approved by Professor Engineering/ Technologist, attached. | |
| | Certificate of compliance to be supplied after installation | |

Note:

Soft reconnection
If momentary synchronisation/paralleling with Stellenbosch Municipality distribution network is required prior to operating the interlocking device when Stellenbosch Municipality supply is restored, a professional engineer/ technologist must approve the complete installation.

# SECTION D

List of Regulatory requirements and normative references:

| | √ |
|---|---|
| AMEU guidelines for the Safe Use of Portable Generators on Utilities Networks, Revision 10 dated 27 June 2008 | |
| Department of Environmental Affairs and Tourism in terms of Environmental Conservation Act, No. 73 of 1989 as amended and National Environmental Management Act, No. 107 of 1998 as amended | |
| Electricity Supply By-Law | |
| Explosives Act, No.26 of 1956, as amended | |
| NRS 003, SANS 62271: 11 kv switchgear and control panels | |
| NRS 029: Current transformers for a.c voltages (3,6kV -≤ 420kV) | |
| NRS 030: Voltage transformers for a.c voltages (3,6kV - ≤ 145kV) | |
| NRS 034: Design guidelines (where applicable) | |
| NRS 054: Power transformers | |
| Occupational Health and Safety Act, No. 85 of 1993, as amended | |
| SABS ISO 8628 (Parts 1 – 8): 1993 – Reciprocating internal combustion engine driven alternating current sets | |
| SANS 342, SANS 10089 – Petroleum and diesel fuel | |
| SANS 10142-1, The Wiring of Premises Part 1. A completed | |

| | |
|---|---|
| copy of the Certificate of Compliance for the complete electrical installation must be submitted prior to reconnection of the supply to the premises after installation work that specify the electrical and mechanical break, before make interlock that prevents paralleled operation with Stellenbosch Municipality electrical Distribution network. | |
| SANS 60034: Rotating Electrical machines | |
| Soft reconnection: Written approval provided by a professional engineer/ technologist for the complete electrical installation design, construction and commissioning is required. | |

# SECTION E

| | |
|---|---|
| Any other additional information: | |

I request the Stellenbosch Municipality, Electrical Services to proceed with a preliminary review of this standby generation application and agree to pay the cost associated with completing this review and giving written consent.

| | | |
|---|---|---|
| Application Completed By: | Name: | Title: |
| | | |

Date: _____

Signed: _____

| | YES | NO |
|---|---|---|
| Fire switch installed: | | |
| Certificate of compliance attached: | | |

# SECTION F
# APPROVAL TO INSTALL STANDBY GENERATOR/ BACKUP SYSTEM

**1. Fire Brigade**

Official: _____ Signature: _____

Date: _____

**2. Electrical Department**

Official: _____ Signature: _____

Date: _____

# SECTION G
# APPROVAL TO CONNECT STANDBY GENERATOR / BACKUP SYSTEM

**1. Fire Brigade**

Official: _____ Signature: _____

Date: _____

2. **Electrical Department**

Official: _____ Signature: _____

Date: _____

3. **Spatial, Planning and Heritage Environment proof of noise level compliance attached?**

| YES | NO |
|---|---|
| | |

4. **Final Inspection**

| | YES | NO |
|---|---|---|
| Certificate of Compliance Submit | | |
| Inspection Neutral link | | |
| Earth Electrode Reading | | |
| Witness: | | |

Witness by: _____ Signature: _____

Date: _____

## 4. Installation requirements

### 4.1 Legal requirements

4.1.1 An application for the use of a standby/portable generator (new or existing) in the case where it will be required to interface with the same circuitry used to locally distribute mains supplied electrical power, shall be submitted to the relevant electricity distribution utility.
The application shall include, but might not be limited to, the following:

a) Contact details of the owner of the premises;
b) Site address;
c) The make and model of the standby/portable generator;
d) The capacity of the standby/portable generator; and
e) The control circuit diagram of the standby/portable generator including all interlocks with the main grid.
4.1.2 Work shall only commence upon written approval from the relevant electricity utility.

### 4.2 Safety requirements

The attention of the owner or tenant of a standby/portable generator is drawn to the following legal requirements (see Foreword):

"Any user of machinery shall:

a) Ensure that all machinery used by him is suitable for the purpose for which it is used, and that it is installed, operated and maintained in such a manner as to prevent the exposure of persons to hazardous or potentially hazardous conditions or circumstances.
b) In particular cause every exposed and dangerous part of the machinery, which is within the normal reach of a person to be effectively safeguarded by means of insulation, fencing, screening or guarding, except where an inspector has granted written permission for the omission of such safeguarding.
c) Ensure that all safety equipment is kept in a good working condition and is properly used and ensure that the quality of material used in and the construction of the machinery or safety equipment is suitable for the purpose for which it was intended.
d) Not remove any safety equipment which relates to the machinery in question unless a person has been authorised thereto.
e) Provide devices to start and stop machinery, and these devices shall
i. Be in a position where they can be readily and conveniently reached by the person who operates such machinery; and
ii. Be so constructed and arranged to prevent the accidental starting of such machinery.
f) Provide positive means for rendering the controls of machinery driven by an electric motor inoperative while repairs or adjustments are being made, and such means shall not only be the mere tripping of a switch."

### 4.3 Additional safety requirements and recommendations

4.3.1 Additional safety requirements and recommendations are given in 4.3.2 to 4.3.24.
4.3.2 The installation shall take place within the boundaries of the approved application.
4.3.3 The owner or tenant shall comply with the relevant noise and pollution legislation detailed in Annex A.
4.3.4 Where new buildings are erected or alterations to existing buildings are made, building plans are to be submitted to the relevant local authority for approval.
4.3.5 The owner or tenant shall comply with the relevant legislation (see Foreword) for the storage of fuel.
4.3.6 Never use a generator in enclosed or partially enclosed spaces. Generators can produce high levels of carbon monoxide (CO) very quickly. When using a standby/portable generator, remember that one cannot smell or see CO. Even if a person can't smell exhaust

fumes, he or she may still be exposed to CO. Adequate ventilation shall be provided.

4.3.7 Only operate the generator outdoors in a well-ventilated, dry area, away from air intakes to the home, and protected from direct exposure to rain, preferably under a canopy, open shed, or carport. Do not enclose the generator in any structure.

4.3.8 Keep flammable materials away from the generator.

4.3.9 Always fuel the generator in a well-ventilated area. Fuel vapours are highly flammable and might ignite after the engine has been started. Be sure that any spilled fuel is cleaned up before restarting.

4.3.10 Always check for fuel leaks.

4.3.11 Before refuelling the generator, turn it off and let it cool down. Fuel spilled on hot engine parts could ignite.

4.3.12 Do not leave the generator unattended.

4.3.13 The total rated capacity of the generator shall not be exceeded.

4.3.14 Keep cables out of the way to avoid the danger of tripping over them.

4.3.15 Ensure that the generator's terminal voltage rating matches that of the load equipment (typically 230 V ±10%).

4.3.16 Ensure that emergency isolation of the generator is possible.

4.3.17 In the case of temporary generators being connected, ensure that there is complete isolation of the consumer's apparatus from the electricity distribution utility's equipment.

4.3.18 Have the generator run at full speed before placing load on it. This prevents damage as the generator starts and reaches full speed.

4.3.19 For permanently installed generators, ensure that permanent electrical interlocking exists between the consumer and the utility.

4.3.20 Ensure that all appliances or equipment connected to the generator have overcurrent protection or, preferably, the supply from the generator shall be equipped with overcurrent protection.

4.3.21 Turn off all loads before turning off the generator. (See Annex B for appliance ratings).

4.3.22 Check that the cables are free of cuts or tears and that the plug has all three prongs, especially a grounding pin.

4.3.23 Do not attempt to power the house wiring by plugging the generator into a wall outlet. This is known as "back feeding" and is an extremely dangerous practice. It presents an electrocution risk to utility workers and neighbours served by the same utility transformer.

4.3.24 Surge protection should be used as it is common for generators to damage more sensitive electronic equipment.

### 4.4 Connection requirements

4.4.1 Connection requirements are given in 4.4.2 to 4.4.9.

4.4.2 It is the responsibility of the applicant to arrange with the electricity distribution utility for the disconnection or reconnection of the mains supply to the premises when it becomes necessary to install the generator. Please note that the latest electricity distribution tariffs will apply for this service.

4.4.3 A CoC shall be completed for the installation and submitted to the relevant electricity utility before reconnection of supply to the premises.

***4.4.4 A permanent red label (PVC or aluminium) with white lettering (of height of at least 10 mm) shall be affixed to the main distribution board inside the premises as well as to all other distribution boards fed from the main board and the main incoming utility supply circuit-breaker. The label shall read, "Danger: generator connected". Where only parts of the installation are supplied by alternative means, only these circuits shall be labelled.***

***4.4.5 Two permanent white label (300 x 300 aluminium) with red lettering (of height of at least 30 mm) shall be affixed next to the fire switch***

# NOTICE

## In case of emergency shut down.

# NOTICE

Standby generator on site.

Size 300 x 300

# NOTICE

# ALTERNATIVE SUPPLY ON SITE.

(Size 300 x 300)

***4.4.6 Where any form of alternate supply (generator, UPS, etc.) is connected and automatically supplies power to circuits on the distribution board, a visible indicator (light) shall be provided on each distribution board where such circuits are live after the main supply on that board has been switched off.***

4.4.7 Appropriately rated protective devices shall be supplied for short-circuit and earth fault conditions to protect the distribution board, generator and user. The protective devices shall prohibit feedback onto the utility system once the main incoming supply has been switched off. The generator shall be provided with a separate, appropriately rated overcurrent protection circuit breaker, over and above any devices installed on the generator itself. Earth leakage protection shall be provided in accordance with the applicable requirements in SANS 10142-1.

4.4.8 Unless specifically agreed upon between the electricity distribution utility and the owner or tenant, the generator shall not run in parallel with the main supply at any time.

4.4.9 The consumer shall be held responsible for all damages incurred by the utility or by himself if the devices are found to be rated incorrectly or the utility supply and generator supply are paralleled (or both).

4.4.10 Neutral earthing of the generator shall be done in accordance with the requirements in SANS 10142-1.

4.5 Single residential houses or individual commercial units

4.5.1 In addition to the abovementioned requirements, the installation of a generator at single residential premises shall comply with the requirements given in 4.5.2 to 4.5.5.

4.5.2 A control panel shall be installed after the meter point and as close to the main distribution board as possible in the case of both conventional and prepayment meters.

4.5.3 The control panel shall include at least
a) a main circuit-breaker, and
b) a manual or automatic changeover switch (see Annex C).

4.5.4 Where the generator is intended to provide a supply to an installation as a switched alternative to the main supply, the changeover switch shall disconnect the main supply before the generator is switched on. The changeover switch shall be interlocked in such a way that the main supply and the alternative supply cannot be connected to the same installation at the same time. This changeover switch shall be of a break-before-make type and have an appropriate rating for the size of generator as detailed in Annex B.

4.5.5 No other means of connection are allowed.

4.6 Commercial, office or multi-unit blocks

4.6.1 In addition to the abovementioned requirements, the installation of a generator at commercial or multi-unit premises shall comply with the requirements given in to

4.6.2 An automatic or manual changeover panel shall be installed.

4.6.3 The control panel (automatic or manual) (see Annex C) shall have at least
a) a main circuit-breaker,
b) a visible indicating light switched on when the generator is supplying power,
c) a manual changeover switch. This changeover switch shall be of a break-before-make type and have an appropriate rating for the size of generator as detailed in Annex B,
d) an emergency stop button which is easily accessible, is provided for the generator and which shall prevent the generator from accidental starting,
e) a remote emergency stop button (utility controlled). The remote emergency stop button shall be installed next to the main incoming utility supply circuit breaker and shall have a label that identifies it. Alternatively, a circuit breaker with auxiliary contacts connected to the emergency stop or starter button may be installed to prevent the generator from starting if the main incoming supply is switched off due to safety reasons (i.e. in case of fire, etc.),
f) in the case of an automatic changeover panel, a fool proof interlocking system that prevents the main supply from being connected to generator supply. This interlocking system shall incorporate a mechanical as well as an electrical interlock on the changeover contactors
or relays.

4.6.4 Where an individual unit within an office or multi-unit block has a generator, requirements for single residential houses shall be applied.

4.6.5 Where two adjacent commercial plots are supplied from a shared generator, each plot or connection (or both) shall have its own control or changeover panel as above.

**Noise levels**

A "disturbing noise" means a noise level that causes the ambient noise level to rise above the designated zone level or, if no zone level has been designated, the typical rating level for ambient noise in districts, indicated in SANS 10103, and given in Table A.1, are applicable. See SANS 10103 for more detail.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Type of District | Equivalent continuous rating level ($l_{Reg.}T$) for noise dBA | | | | | |
| | Outdoors | | | Indoors, with open windows | | |
| | Day/night $L_{R,dn}$ a | Daytime $L_{Req,d}$ b | Night-time $L_{Req.n}$ b | Day/night $L_{R,dn}$ a | Daytime $L_{Req,d}$ b | Night-time $L_{Req.n}$ b |
| Residential Districts | | | | | | |
| (a) Rural districts | 45 | 45 | 35 | 35 | 35 | 35 |
| (b) Suburban districts with little road traffic | 50 | 50 | 40 | 40 | 40 | 30 |
| (c) Urban districts | 55 | 55 | 45 | 45 | 45 | 35 |
| Non-residential districts | | | | | | |
| (d) Urban districts with some workshops, business premises and main roads | 60 | 60 | 50 | 50 | 50 | 40 |
| (e) Central Business Districts | 65 | 65 | 55 | 55 | 55 | 45 |
| (f) Industrial districts | 70 | 70 | 60 | 60 | 60 | 50 |

Note 1: If the measurement or calculation time interval is considerably shorter than the reference time intervals, significant deviations from the values given in the table might result.

Note 2: If the spectrum of the sound contains significant low-frequency components, or when an unbalanced spectrum towards the low frequencies is suspected, special precautions should be taken, and specialist advice should be obtained. In this case, the indoor sound levels may differ significantly from the values given in columns 5 to 7 in Table A.1.

Note 3: Residential buildings, e.g. dormitories, hotel accommodation, residences etc., should only be allowed in non-residential districts on condition that the calculated or

anticipated outdoor LReq.T values given in column 3 of Table A.1 are not exceeded.

a) The values given in columns 2 and 5 are equivalent continuous rating levels and include corrections for tonal character, impulsiveness of the noise and the time of day.

b) The values given in columns 3, 4, 6 and 7 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness of the noise.