SECTION 2.1: SPECIFICATIONS

2.1.1 Technical Specifications

2.1.1.1 General Supply Requirements

1. All equipment and material tendered must be clearly stamped or marked with the manufacturer's brand name/logo or any other identifiable marking that will be freely and clearly available after installation, to identify the manufacturer during maintenance or with breakdowns to ensure effective quality control. Items equipped with data plates complies, provided that the manufacturer are clearly indicated on the data plate.

2. Items that are difficult or impossible to mark, e.g. steel wire, bare copper conductor, etc. shall be tagged with a metal type data plate or tag with the manufacturer's data stamped or printed onto the plate or tag and shall be affixed by means of a durable cable or other binding material to a clearly visible point of the item or any one of the items in a batch delivery.

3. Tenderers wishing to tender must ensure that the items being tendered for, forms part of the daily core business of the tenderer. Other items must be sourced from a reputable supplier of which those items form part of that supplier's core business and must be so indicated on the tender document.

4. When tendering on "equivalent" equipment, the onus lies with the tenderer to prove that items tendered are indeed equivalent to or exceed the specifications of listed items in the tender document under the Brief Specifications schedule.

5. No items may be tendered by a tenderer for which the tenderer can't support the full warranty/guarantee as is offered standard by the manufacturer when supplied through the manufacturer's supported dealer network.

6. Items must be delivered fully functional and operational to the applicable SANS (SABS) or International (IEC, BS, etc.) standards, notwithstanding any omissions or errors in the specifications. Costs to make the supplied items safe, functional and operational, or to exchange delivered and installed sub-standard (non-compliant) items for new compliant items that meet the minimum requirements or standards, will be for the tenderer's account.

Initials of Service Provider's Authority: .....

ITEM 1: SUPPLY AND DELIVERY OF MINI-SUBSTATIONS

1. Scope of Supply

This specification covers the design, manufacture, testing, supply, delivery and commissioning of outdoor mini-substations for use on the municipal 11 kV distribution network, with 400 V three-phase low-voltage distribution.

Mini-substations shall be factory-built, type-tested units comprising a medium-voltage compartment, transformer compartment and low-voltage distribution compartment, delivered as a complete, ready-to-install assembly.

2. Applicable Standards

All equipment shall comply with the latest editions of the following (or equivalent approved) standards:

- SANS 1029 – Mini-substations for rated voltages up to 36 kV
- SANS 780 / IEC 60076 – Power transformers
- SANS 60529 – Degrees of protection (IP code)
- SANS 10313 – Earthing of mini-substations
- SANS 61439 – Low-voltage switchgear assemblies
- IEC 62271-202 – Prefabricated substations
- IEC 60255 / 60947 – Protection and switchgear devices
- NRS 053 / 004 / 097 – Distribution transformer and LV interface standards
- SANS 10142-1 – Wiring of premises
- Occupational Health & Safety Act and ISO 9001 / ISO 14001 for manufacturing and environmental management.

Where conflict arises, this specification shall take precedence.

3. Service Conditions

Mini-substations shall be suitable for operation under the following typical outdoor conditions:

Parameter	Requirement
System voltage	11 kV ±10 %
Frequency	50 Hz ±2 %
System neutral	Earthed neutral
Ambient temperature	–10 °C to +45 °C
Relative humidity	Up to 95 % (non-condensing)
Altitude	Up to 1 500 m above sea level
Pollution level	Medium to heavy coastal environment
Installation	Outdoor, free-standing or plinth-mounted

4. General Construction

- The mini-substation shall be outdoor, weatherproof, IP54 or better, vandal-resistant, vermin-proof, and lockable.
- Compartments (MV, transformer, LV) shall be segregated and interlocked for operator safety.
- Adequate natural ventilation shall be provided with stainless-steel or UV-resistant vermin-proof mesh.
- Lifting lugs and forklift pockets shall be provided for safe transport and handling.

Coastal Environment Finish

- All structural steel shall be hot-dip galvanised to SANS 121 / ISO 1461 after fabrication.

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- External surfaces shall receive a UV-resistant avocado-green (RAL 6011) polyester-epoxy powder-coat finish to a total dry-film thickness ≥ 200 µm, suitable for high-salinity, high-humidity conditions.
- Coating shall pass:
  - Salt-spray test ≥ 1 000 h (ISO 9227 / ASTM B117)
  - Standard adhesion and impact tests
- Internal surfaces shall be coated light-grey (RAL 7032) to improve visibility.
- All external hinges, locks, fasteners and fittings shall be stainless-steel grade 304 or 316, unpainted and isolated from galvanised steel with non-conductive washers to prevent bi-metallic corrosion.
- Transformer oil, gaskets, seals and polymeric components shall be UV-stable and resistant to coastal humidity and salt spray.
- All compartments shall have stainless-steel danger signs and equipment labels affixed externally.

5. Transformer

- Rated power: typically 100 kVA, 160 kVA, 200 kVA, 315 kVA, 630 kVA, 800 kVA
- Primary voltage: 11 kV
- Secondary voltage: 400 V three-phase, 230 V single-phase
- Vector group: Dyn11
- Impedance voltage: as per SANS 780, typically 4 % for 200 kVA
- Cooling: ONAN, mineral oil to IEC 60296 (non-PCB)
- Temperature rise: ≤ 60 °C above ambient
- Tappings: ±2 × 2.5 % off-circuit tap changer
- Fitted with:
  - Outdoor bushings
  - Oil-level gauge, thermometer pocket
  - Drain and filter valves
  - Pressure relief device
  - Silica-gel breather and conservator

6. Medium-Voltage Compartment

- Rated for 12 kV systems
- Short-time withstand current ≥ 16 kA for 3 s
- Equipped with:
  - SF_6 ring-main unit (two load-break switches and one fuse-switch for transformer protection), or vacuum circuit-breaker panel (as specified)
  - Fault-making earthing switch
  - Voltage presence indicators to IEC 61243-5
- Arc-resistant to IEC 62271-202
- Interlocked and pad-lockable doors to prevent unsafe access

7. Low-Voltage Compartment

- Rated for 400 V, 3-phase, 4-wire, 50 Hz
- Busbar short-circuit withstand ≥ 36 kA for 1 s
- Copper busbars colour-coded (R-Y-B-N) and fully shrouded
- Incoming breaker: MCCB or ACB with adjustable overload & short-circuit protection
- Outgoing feeders: MCCBs or fuse-switch units as required

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- Provision for metering CTs and VTs
- IP54 or better with internal shrouding
- Space for municipal AMI or prepaid meters

8. Earthing

- All metallic parts including transformer tank, MV and LV compartments, surge arresters and doors shall be bonded to a common earth bar.
- Earth bar shall be suitable for connection to a 70 mm² bare copper earth conductor.
- Earthing to comply with SANS 10313 and local municipal standards.

9. Surge Protection

- Heavy-duty gapless metal-oxide surge arresters to IEC 60099-4 shall be provided on all MV phases and bonded to the common earth bar.

10. Nameplates and Marking

Each unit shall have a stainless-steel nameplate displaying:

- Manufacturer's name, serial number and year of manufacture
- Transformer ratings, vector group and impedance
- Switchgear ratings
- IP rating
- Mass of transformer and total assembly

Safety labels and danger notices shall be provided in English and Afrikaans.

11. Testing and Quality Assurance

Manufacturer to be ISO 9001 certified.

- Type tests (certificate to be supplied): temperature-rise, short-circuit, impulse, arc-resistance, IP/IK degree of protection.
- Routine tests on every unit: ratio, impedance, insulation resistance, winding resistance, oil tests, functional checks of MV and LV switchgear.

The municipality reserves the right to witness routine tests.

12. Delivery

Units to be factory-assembled, oil-filled and ready for service, supplied on skids or plinth-mountable base, wrapped for transport.

Delivery to municipal stores or to site as instructed.

13. Documentation

Supplier to provide:

- 3 × sets of operation & maintenance manuals
- Dimensional drawings and wiring diagrams
- Foundation drawings and loading data
- Test certificates and warranty
- Spare parts list
- Touch-up paint for avocado-green finish

Initials of Service Provider's Authority: .....

14. Warranty

The complete unit shall be warranted for 24 months after commissioning or 30 months after delivery, whichever comes first.

Defects due to faulty design, materials or workmanship shall be rectified at the supplier's expense.

15. Compliance and References

Bidders shall submit with their offer:

- Completed compliance schedule (Yes/No for each clause)
- Technical datasheets of the proposed equipment
- Valid type-test certificates from accredited labs
- Proof of ISO 9001 / ISO 14001 certification

Initials of Service Provider's Authority: .....

ITEM 2: SUPPLY AND DELIVERY OF DISTRIBUTION TRANSFORMERS

1. Scope

Supply, manufacture, test, deliver and commission outdoor, oil-immersed distribution transformers for use on the municipal 11 kV network with 400 V three-phase (230 V single-phase) LV output.
Transformers may be supplied as:

- Pole-mounted units for rural / smaller loads.
- Ground / plinth-mounted units for larger loads.
- Where specified, fitted with an integral LV compartment containing busbars, protective devices and metering equipment.

2. Applicable Standards

Transformers shall comply with the latest editions of:

- SANS 780 / IEC 60076 – Power transformers
- NRS 053 / NRS 058 – Distribution transformer specifications
- IEC 60076-5 – Short-circuit withstand
- IEC 60296 – Insulating oil (PCB-free)
- SANS 60529 – IP degrees of protection
- SANS 10313 – Earthing of substations
- SANS 10142-1 – Wiring of premises
- Manufacturer certified to ISO 9001 and ISO 14001

Where any conflict arises, this specification shall prevail.

3. Service Conditions

Designed for continuous outdoor operation under:

Parameter	Requirement
System voltage	11 kV ±10 %
Frequency	50 Hz ±2 %
Neutral system	Earthed neutral
Ambient temperature	–10 °C to +45 °C
Relative humidity	Up to 95 % (non-condensing)
Altitude	Up to 1 500 m above sea level
Environment	Medium to heavy coastal corrosion & pollution

4. Ratings

Typical ratings (as required in tender schedule):

- Pole-mounted: 16 kVA (1-ph), 25 kVA (1-ph), 50 kVA, 100 kVA, 160 kVA, 200 kVA
- Plinth-mounted: 100 kVA, 160 kVA, 200 kVA, 315 kVA, 630 kVA, 800 kVA
- Pole-mounted with Integral LV Compartment: 100 kVA, 160 kVA, 200 kVA

Primary voltage: 11 kV
Secondary voltage: 400 V three-phase (230 V phase-neutral)
Vector group: Dyn11
Tapping range: ±2 × 2.5 % (off-circuit tap-changer)
Cooling: ONAN (Oil Natural Air Natural)
Insulation level: 12/28/75 kV BIL for 11 kV

Initials of Service Provider's Authority: .....

Impedance: as per SANS 780 (e.g. ~4 % for 200 kVA)

Efficiency: meet or exceed NRS low-loss category
Temperature rise: ≤60 °C above ambient at rated load

5. Construction

- Core and windings: copper or aluminium, designed for low losses and complying with SANS 780.
- Tank: sealed type (hermetically sealed or conservator-type as specified) complete with:
  - Oil-level indicator
  - Pressure-relief device
  - Thermometer pocket
  - Drain and filter valves
- HV Terminations:
  - Up to 200 kVA: outdoor porcelain/polymeric bushings or cable box
  - Larger sizes: cable box for 11 kV 3-core XLPE cables
- LV Terminations:
  - Outdoor bushings for smaller sizes
  - Cable box for larger sizes
  - Neutral brought out for solid earthing
- Mounting:
  - Pole-mounted with lifting lugs and brackets for standard H-pole or platform mounting
  - Skid or roller base for ground/plinth installation
- Earthing: tank and neutral terminals suitable for direct connection to earth electrode in accordance with SANS 10313.

6. LV Compartment (Where Specified)

For transformers supplied with an integral LV compartment:

- Weatherproof enclosure, IP54 or better, pad-lockable.
- Fitted with:
  - LV busbars rated for full transformer capacity
  - Outgoing feeders via MCCBs or fuse-switch units as required
  - Space for metering CTs / VTs and energy meters
- Internal surfaces coated light-grey (RAL 7032) for visibility.

7. Coastal Environment Protection

- All external steelwork hot-dip galvanised to SANS 121 / ISO 1461 after fabrication.
- Tank and enclosures hot-zinc-metal-sprayed and coated with approved epoxy or polyurethane paint.
- Final colour: Avocado-Green (C12 per SANS 1091) as specified.
- Coating to pass:
  - Salt-spray ≥1 000 h (ISO 9227 / ASTM B117)
  - Standard adhesion and impact tests
- External fittings (bolts, nuts, hinges, latches) in stainless-steel grade 304/316.
- All gaskets, bushings, seals and polymeric components to be UV- and salt-resistant.

Initials of Service Provider's Authority: .....

8. Accessories
Each transformer shall be supplied complete with:

- Lifting lugs and jacking points
- Oil-filling, draining and sampling valves
- Earthing terminals for tank and neutral
- Mounting points for HV surge arresters
- Stainless-steel rating and diagram plate, permanently marked with manufacturer, serial number, ratings and vector group.

9. Testing & Quality Assurance
All transformers shall be accompanied by:

- Manufacturer's ISO 9001 certificate
- Type-test certificates for representative units (temperature-rise, efficiency, impedance, impulse withstand, short-circuit, noise level)
- Routine tests on each transformer (ratio, polarity, impedance, insulation resistance, oil tests, functional checks)
- Municipality reserves the right to witness routine tests.

10. Delivery

- Units delivered factory-assembled, oil-filled and ready for service.
- Supplied on treated timber skids or suitable bases, shrink-wrapped for transport.
- Each unit clearly marked with rating, serial number and delivery note.

11. Documentation & Warranty
Supplier shall provide:

- 3 × sets of operation and maintenance manuals
- Type-test and routine-test certificates
- General-arrangement drawings, foundation / mounting details
- Spare-parts list and touch-up paint matching avocado-green finish

Warranty: 24 months from commissioning or 30 months from delivery, whichever is sooner.
Any defects due to faulty design, materials or workmanship shall be rectified at the supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 3: SPECIFICATIONS FOR RING MAIN UNITS AND SWITCHGEAR

1. Scope

Supply, manufacture, test, deliver and commission 11 kV medium-voltage switchgear for use on the municipal distribution network, including:

- Ring Main Units (RMUs) for new mini-substations and feeder/sectionalising points.
- Transformer-protection switchgear for connection to existing distribution transformers.
- Equipment suitable for outdoor installation in coastal environments.

Switchgear may be SF_6-insulated, solid-insulated or vacuum-interrupter type, as specified in the schedule.

2. Applicable Standards

All equipment shall comply with the latest editions of:

- IEC 62271-1, IEC 62271-200 / 202 – High-voltage switchgear & prefabricated substations
- IEC 62271-103 – Load-break switches
- IEC 62271-105 – Switch-fuse combinations
- IEC 62271-100 – High-voltage circuit-breakers
- IEC 62271-102 – Earthing switches
- IEC 62271-203 / 200 – SF_6 or gas-insulated switchgear
- IEC 62271-206 – Arc-proof design
- IEC 60529 – Degrees of protection (IP rating)
- NRS 053 / NRS 089 – South African distribution switchgear
- ISO 9001 / ISO 14001 – Quality and environmental management

Where conflict arises, this specification shall prevail.

3. Service Conditions

Parameter	Requirement
Rated system voltage	11 kV ± 10 %
Rated frequency	50 Hz ± 2 %
Neutral system	Earthed neutral
Short-circuit withstand	≥ 16 kA for 3 s
Rated current (ways)	630 A continuous (unless otherwise stated)
Ambient temperature	–10 °C to +45 °C
Relative humidity	up to 95 % (non-condensing)
Altitude	≤ 1 500 m above sea level
Environment	Medium- to heavy-corrosion coastal conditions

4. General Construction

- Enclosure:
  - Outdoor-rated, weatherproof, arc-resistant, IP 54 or better.
  - Fabricated from steel, hot-dip galvanised to SANS 121 / ISO 1461, over-coated with UV-resistant epoxy-polyester powder coat, colour Avocado-Green (RAL 6011) as specified.
  - Coating ≥ 200 µm DFT, passing salt-spray ≥ 1 000 h (ISO 9227), adhesion and impact tests.
  - All external fasteners, locks, hinges in stainless-steel 304/316.

Initials of Service Provider's Authority: .....

- Switching technology:
  - SF_6 gas-insulated, sealed-for-life load-break switches for feeder/sectionalising ways.
  - Switch-fuse combination or vacuum circuit-breaker for transformer-protection way.
  - Sealed compartments to prevent ingress of moisture, dust and vermin; maintenance-free during service life.
- Safety features:
  - Mechanically interlocked earthing switches for each way.
  - Voltage-presence indicators to IEC 61243-5.
  - Pad-lockable operating handles and mimic diagrams.
  - Arc-proof construction to IEC 62271-202.
- Cable terminations:
  - Front-accessible, suitable for screened plug-in or heat-/cold-shrink terminations for XLPE cables.
- Endurance:
  - Mechanical and electrical endurance ≥ 10 000 operations for load-break switches and ≥ 5 000 for circuit-breakers.

5. Configurations

(As per tender schedule)

- 3-Way RMU: two feeder load-break switches + one transformer-protection way.
- 4-Way RMU: three feeder load-break switches + one transformer-protection way.
- 5-Way RMU with metering: four feeder load-break switches + one transformer-protection way with integral metering CT/VT.
- Transformer-protection switchgear for existing transformers: stand-alone panel or kiosk with vacuum-breaker or switch-fuse unit, suitable for outdoor plinth-mounting.

6. Metering (Where Specified)

- Integral or separate metering compartment:
  - Current transformers: class 1, 15 VA, short-time rating ≥ 16 kA/3 s.
  - Voltage transformers: 11 kV / 110 V, class 0.5, 100 VA.
  - Fitted with fuses, terminal blocks and segregated wiring space for municipal meter.

7. Accessories

- Lifting lugs and transport skids.
- Operating handles, tools and safety instructions.
- Danger and operating signage in English & Afrikaans.
- Earthing terminals and provision for surge-arresters.

8. Tests and Quality Assurance

- Manufacturer to be ISO 9001 certified.
- Type-tests on representative unit:
  - Dielectric and impulse withstand, temperature-rise, short-circuit and making-capacity, mechanical endurance, arc-resistance, IP/IK.
- Routine-tests on each delivered unit:
  - Dielectric withstand, gas-tightness / leak test for SF_6 compartments, mechanical operation, functional interlock checks.

Initials of Service Provider's Authority: .....

- Test certificates to be supplied; municipality reserves the right to witness routine tests.

9. Delivery

- Units to be factory-assembled, tested, oil- or gas-filled as required, and ready for service.
- Supplied on skids or plinth-mount bases with protective wrapping.
- Clearly labelled with rating, serial number and connection diagram.

10. Documentation and Warranty

- 3 × sets of operation & maintenance manuals.
- Type-test and routine-test certificates.
- General-arrangement drawings, foundation / plinth details and wiring diagrams.
- Spare-parts list and touch-up paint matching enclosure finish.

Warranty: 24 months after commissioning or 30 months after delivery, whichever is earlier.
Supplier responsible for correcting defects due to faulty design, materials or workmanship.

Initials of Service Provider's Authority: .....

ITEM 4: SPECIFICATIONS FOR ELECTRICAL MEDIUM-VOLTAGE (MV) CABLE

1. Scope

Supply and deliver 11 kV underground distribution cables for the municipal network, suitable for direct-burial or duct installation in coastal outdoor environments:

- 3-core XLPE-insulated, PVC-sheathed, steel-wire/tape-armoured cables with copper or aluminium conductors for new installations.
- 3-core PILC (paper-insulated lead-covered) Table 18 / Table 19 cables for repair or replacement of existing legacy circuits.

2. Applicable Standards

- SANS 97 (Table 18 & 19) – Paper-insulated lead-covered cables up to 33 kV
- IEC 60502-2 – Power cables for voltages up to 30 kV
- IEC 60332 / SANS 60332 – Flame-propagation for cables
- SANS 1411-1 – Marking and packaging of cables
- ISO 9001 / ISO 14001 – Quality & environmental management

Where conflict arises, this specification prevails.

3. Service Conditions

- Rated system voltage: 11 kV ± 10 %
- Frequency: 50 Hz ± 2 %
- Maximum conductor temperature: 85 °C in normal service
- Installation: direct-buried or in trenches/ducts
- Minimum bending radius: ≥ 12 × overall cable diameter
- Environment: outdoor; medium- to heavy-corrosion coastal conditions

4. Construction Requirements

- Cables shall conform to the type specified in the BOQ: XLPE-insulated construction for all new works and PILC Table 18 / 19 construction for legacy network repairs.
- Conductor: high-conductivity, stranded, annealed copper or aluminium per SANS 97
- Insulation:
  - Table 18 – impregnated paper belted insulation for 11 kV
  - Table 19 – impregnated paper with individual core screens and a collective metallic screen for stress control
- Metallic Sheath: seamless lead sheath providing radial water-blocking
- Bedding & Armouring: PVC or impregnated jute bedding; for direct-burial, galvanised steel wire/tape armour as per SANS 97 Table 18/19; for duct installation, un-armoured or light-armoured as specified
- Outer Covering: black extruded PVC (ST2 grade) or bituminous compound suitable for underground service
- Marking: each metre clearly and durably marked with manufacturer's name, year, voltage rating, conductor material & size, and "SANS 97 Table 18" or "SANS 97 Table 19" as applicable

Initials of Service Provider's Authority: .....

5. Standard Cable Sizes

Conductor Material	Table 18 (Belted)	Table 19 (Screened)
Copper	3-core 50, 70, 95, 120, 150, 185, 240, 300 mm²	3-core 50, 70, 95, 120, 150, 185, 240, 300 mm²
Aluminium	3-core 70, 95, 120, 150, 185, 240, 300 mm²	3-core 70, 95, 120, 150, 185, 240, 300 mm²

Rated voltage: 12 kV (Um = 12 kV)
Short-circuit withstand: as per SANS 97 for each conductor size.

6. Accessories

- Heat-shrink or resin-filled joints and terminations
- Correctly sized separable connectors and glands
- Tinned-copper lugs for copper conductors, bi-metal lugs for aluminium
- Bonding and earthing as per network drawings

7. Tests and Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Type-tests on a representative sample:
  - Conductor resistance
  - AC and impulse withstand
  - Insulation integrity and partial-discharge
  - Bending, tensile and mechanical tests
  - Fire-performance per SANS 60332
  - Corrosion and environmental durability
- Routine-tests on each production batch:
  - Conductor resistance
  - AC withstand on every cable length
  - Insulation thickness and uniformity
  - Sheath integrity
- Certified test reports to accompany every batch or drum
- Municipality reserves the right to witness routine tests

8. Packaging and Delivery

- Cables to be supplied on robust wooden or steel drums, each clearly labelled with manufacturer, type, size, voltage rating, conductor material, length, gross & net mass
- Cable ends to be sealed and capped to prevent moisture ingress
- Drums to be lagged for outdoor storage
- Minimum continuous drum length: 300-500 m unless otherwise agreed

9. Documentation and Warranty

- Supplier to provide:
  - Type-test & routine-test certificates for each batch / drum
  - Storage, transport & installation guidelines
  - Manufacturer's declaration of compliance with all relevant standards

Initials of Service Provider's Authority: .....

Warranty: 12 months from installation or 18 months from delivery, whichever occurs first.
Any defective lengths to be replaced at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 5: SPECIFICATIONS FOR ELECTRICAL LOW-VOLTAGE (LV) CABLE

1. Scope

Supply and deliver 600/1000 V low-voltage underground power and service cables for the municipal distribution network, suitable for direct-burial, duct, or service-entry installation in coastal outdoor environments, including:

- XLPE-insulated, PVC-sheathed, steel-wire-armoured (SWA) 2-/3-/4-core copper or aluminium conductor cables for LV feeders.
- PVC split-concentric (Airdac) service cables with pilot for service connections.
- XLPE-insulated single-core copper armoured cables for high-capacity LV circuits.

2. Applicable Standards

All cables shall comply with the latest editions of the following standards (or equivalent approved):

- SANS 1507-3 – Armoured PVC / XLPE insulated 600/1000 V power cables
- SANS 1507-6 – Unarmoured PVC / XLPE insulated 600/1000 V power cables
- SANS 1411-6 & SANS 1411-1 – Split-concentric (Airdac) service cable and cable marking
- ISO 9001 – Quality management
- ISO 14001 – Environmental management

Where conflict arises, this specification prevails.

3. Service Conditions

- Rated system voltage: 230/400 V, 50 Hz
- Continuous operating temperature: 70 °C for PVC; 90 °C for XLPE
- Installation: direct-buried, in ducts, or on trays (LV power cables); façade/service entry for Airdac
- Coastal outdoor environment: ambient –10 °C to +45 °C; RH up to 95 %
- Minimum bending radius: ≥ 12 × overall cable diameter

4. Construction Requirements

- Conductor: high-conductivity, stranded, annealed copper or aluminium
- Insulation:
  - XLPE for LV power cables and single-core Cu feeders.
  - PVC for split-concentric Airdac service cables.
- Bedding & Armouring: PVC bedding with galvanised steel wire armour (SWA) for armoured types; black PVC outer sheath
- Unarmoured types: as per SANS 1507-6 for ducted or indoor use
- Service cable: split-concentric Airdac with pilot to SANS 1411-6
- Marking: every metre clearly and durably marked with manufacturer's name, year, voltage rating, conductor material & size, and the applicable SANS standard

5. Standard Cable Sizes

The tender BOQ will specify the required sizes. Typical range:

- LV Underground Power Cables:
  - Aluminium 2-/3-/4-core XLPE/SWA/PVC: 16, 25, 35, 50, 70, 95, 120, 150, 185, 240, 300 mm²
  - Copper 2-/3-/4-core XLPE/SWA/PVC: 16, 25, 35, 50, 70, 95, 120, 150, 185, 240 mm²
- LV Service Cables:

Initials of Service Provider's Authority: .....

  - Split-concentric (Airdac) with pilot: 10 mm², 16 mm², 25 mm²
- Single-Core LV Cables:
  - XLPE Cu Armoured: 185 mm², 240 mm², 300 mm²

Rated voltage: 600/1000 V

6. Tests and Quality Assurance

- Manufacturer shall be ISO 9001-certified.
- Type-tests on a representative sample:
  - Conductor resistance
  - AC withstand
  - Insulation integrity
  - Mechanical and bending tests
- Routine-tests on each production batch:
  - Conductor resistance
  - AC withstand on every cable length
  - Insulation thickness and uniformity
  - Sheath integrity
- Certified test reports shall accompany each batch or drum.
- Municipality reserves the right to witness routine tests.

8. Packaging and Delivery

- Cables to be supplied on robust wooden drums, each clearly labelled with manufacturer, type, size, voltage rating, conductor material, length, gross & net mass
- Cable ends to be sealed and capped to prevent moisture ingress
- Drums to be lagged for outdoor storage
- Minimum continuous drum length: 500 m unless otherwise agreed

9. Documentation and Warranty

- Supplier to provide:
  - Type-test & routine-test certificates for each batch / drum
  - Storage, transport & installation guidelines
  - Manufacturer's declaration of compliance with all relevant standards

Warranty: 12 months from installation or 18 months from delivery, whichever occurs first.
Any defective lengths to be replaced at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 6: SPECIFICATIONS FOR LINE & EARTH CONDUCTOR

1. Scope

Supply and deliver all conductors for the municipal overhead line and earthing networks, including:

- AAAC (All-Aluminium Alloy Conductor) for standard MV and LV overhead feeders
- ACSR (Aluminium Conductor Steel-Reinforced) for long-span or high-tension feeders
- Bare Hard-Drawn Copper Line Conductor for maintaining or extending legacy copper feeders
- Bare Copper Earth Wire for earthing, bonding and lightning down-conductors
- Bare Galvanised Steel Wire for earth/stay wires

All conductors shall be suitable for continuous outdoor service in coastal environments.

2. Applicable Standards

- SANS 182-3 / IEC 61089 – AAAC overhead conductors
- SANS 182-1 / IEC 61089 – ACSR overhead conductors
- SANS 182-2 – Hard-drawn bare copper conductors for overhead lines
- SANS 182 – Bare copper conductors for earthing
- SANS 675 / SANS 182 – Bare galvanised steel stay/earth wires
- ISO 9001 / ISO 14001 – Quality and environmental management

Where conflict arises, this specification prevails.

3. Service Conditions

- System voltages: 11 kV and 230/400 V distribution networks
- Frequency: 50 Hz ± 2 %
- Installation: pole-top overhead lines and earthing systems
- Environment: outdoor, medium- to heavy-corrosion coastal conditions
- Conductors and fittings shall withstand local mechanical tension and wind loading per municipal line-design standards

4. Overhead Line Conductors

AAAC

- Type: All-Aluminium-Alloy Conductor
- Cross-sectional areas: 50 mm² to 300 mm²
- Properties: diameter, mass, DC resistance at 20 °C, and rated breaking load shall comply with SANS 182-3 / IEC 61089
- Marking: Drums shall be labelled with manufacturer, conductor type, size, length, mass and reference to the relevant standard

ACSR

- Type: Aluminium Conductor Steel-Reinforced to SANS 182-1 / IEC 61089
- Typical Use: For long-span or high-tensile applications (e.g. river crossings, long rural feeders)
- Corrosion Protection: The steel core shall be suitably grease-filled or galvanised for corrosion protection in coastal service

Initials of Service Provider's Authority: .....

- Marking: Drums shall be labelled with manufacturer, conductor type, size, length, mass and reference to the relevant standard

Bare Hard-Drawn Copper Line
- Type: Hard-drawn bare copper to SANS 182-2 / IEC 61089
- Sizes: 16, 25, 35, 50 mm² (or as required to match existing legacy feeders)
- Application: for maintenance or extension of legacy copper overhead feeders still in service
- Supplied on wooden drums, each drum labelled with manufacturer, size, length, mass, and standard reference

5. Earthing and Stay Conductors

Bare Copper Earth Wire
- Type: Hard-drawn bare copper to SANS 182
- Standard sizes: 6, 10, 16, 25, 35, 50 mm²
- Application: for earthing of kiosks, mini-subs, pole-mounted transformers, bonding of overhead lines and lightning down-conductors
- Supplied on drums or coils, each tagged with size, mass, and manufacturer's details

Bare Galvanised Steel Earth / Stay Wire
- Type: Stranded galvanised steel wire to SANS 675 / SANS 182
- Typical sizes: 7/3.15 mm and 7/4.0 mm
- Application: for stays, poles and earth guying
- Supplied on drums, each labelled with manufacturer, size, length, mass, and standard reference

7. Tests and Quality Assurance
- Manufacturer shall be ISO 9001-certified
- Type-tests on representative samples:
  - Conductor resistance at 20 °C
  - Breaking load and elongation
  - Stranding uniformity and diameter
- Routine-tests on each production batch:
  - Resistance check
  - Dimensional verification
- Certified test reports shall accompany each delivery
- The Municipality reserves the right to witness routine tests

8. Packaging and Delivery
- Conductors shall be supplied on robust wooden or steel drums clearly marked with manufacturer, conductor type, size, length, gross & net mass and applicable standard
- Drums shall be lagged for outdoor storage and easy handling
- Ends of conductors shall be securely bound and sealed to prevent unraveling or moisture ingress

Initials of Service Provider's Authority: .....

9. Documentation and Warranty

- Supplier shall provide:
  - Type-test & routine-test certificates for each batch / drum
  - Storage, transport & installation guidelines
  - Manufacturer's declaration of compliance with all relevant standards

Warranty: 12 months from installation or 18 months from delivery, whichever occurs first.
Defective lengths shall be replaced at the supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 7: SPECIFICATIONS FOR AERIAL BUNDLE CONDUCTOR

1. Scope

Supply and deliver Aerial Bundled Conductor (ABC) systems for the municipal distribution network, including:

- LV ABC for 230/400 V overhead distribution and service connections
- MV ABC (if required) for 11 kV overhead feeders
- All necessary fittings and accessories for suspension, dead-ending, service connections and earthing

All materials shall be suitable for continuous operation in coastal outdoor environments.

2. Applicable Standards

- SANS 1418-1 & SANS 1418-2 – LV ABC cables and accessories
- SANS 1713 Type B – MV ABC 6.35/11 kV cables
- SANS 1411-1 – Marking of cables
- ISO 9001 / ISO 14001 – Quality & environmental management

Where conflict arises, this specification prevails.

3. Service Conditions

- Rated voltages:
  - LV: 230/400 V, 50 Hz
  - MV: 6.35/11 kV, 50 Hz (if required)
- Continuous operating temperature: 90 °C for XLPE insulation
- Installation: overhead, pole-mounted, in coastal regions
- Ambient: –10 °C to +45 °C, RH up to 95 %
- Designed to withstand local wind loading and mechanical tension per municipal line-design standards

4. LV ABC Conductors

- Type: XLPE-insulated aluminium conductors to SANS 1418-1
- Typical configurations:
  - 3 × 70 + 54.6 + 25 mm² (3 phase + neutral + earth)
  - 3 × 95 + 54.6 + 25 mm² (3 phase + neutral + earth)
  - 3 × 120 + 70+ 25 mm² (3 phase + neutral + earth)
- Service ABC drops: smaller sizes, e.g. 2 × 16 mm², 2 × 25 mm², as per BOQ
- Marking: each metre to be durably marked with manufacturer, year, size, voltage and relevant SANS reference

5. MV ABC (if required)

- Type: XLPE-insulated aluminium to SANS 1713 Type B for 11 kV
- Typical phase sizes: 35, 50, 70, 95, 120 mm²
- Messenger / neutral: steel-cored or aluminium-alloy as per standard
- To be specified only if required for dedicated MV ABC lines in the BOQ

6. Tests and Quality Assurance

- Manufacturer shall be ISO 9001-certified

Initials of Service Provider's Authority: .....

- Type-tests on representative samples:
  - Conductor resistance
  - AC withstand and insulation integrity
  - Mechanical breaking load and elongation
  - UV and environmental resistance
- Routine-tests on each production batch:
  - Resistance
  - Insulation thickness and uniformity
  - Mechanical verification
- Certified test reports shall accompany each delivery
- The Municipality reserves the right to witness routine tests

7. Packaging and Delivery

- ABC to be supplied on strong wooden or steel drums, clearly labelled with manufacturer, conductor type, size, length, gross & net mass, and relevant SANS reference
- Drums shall be lagged for outdoor storage and handling
- Cable ends to be sealed and capped to prevent moisture ingress

8. Documentation and Warranty

- Supplier to provide:
  - Type-test & routine-test certificates for each batch / drum
  - Storage, transport & installation guidelines
  - Manufacturer's declaration of compliance with all relevant standards

Warranty: 12 months from installation or 18 months from delivery, whichever occurs first.
Defective lengths or fittings shall be replaced at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 8: SPECIFICATIONS FOR CONTROL, AUXILIARY AND INTERNAL WIRING

1. Scope

Supply and deliver low-voltage control, auxiliary, internal and service wiring for use in kiosks, switchboards, mini-substations, distribution boards and other installations, including:

- Single-core PVC-insulated house wire (solid or stranded) for panel wiring and fixed installations
- Flexible multi-core control cables for interconnection of switchgear, metering and protection devices
- Flexible cords for portable equipment and connections where flexibility is required
- Pilot and signal cables as specified in the BOQ

All products shall be suitable for indoor use in kiosks and panels and for coastal outdoor service where exposed.

2. Applicable Standards

- SANS 1507-2 – PVC-insulated single-core wiring cables (solid or stranded)
- SANS 1507-4 – PVC-insulated multi-core control cables
- SANS 1574 – Flexible cords and flexible cables
- SANS 1411-1 – Marking and packaging of electric cables
- ISO 9001 / ISO 14001 – Quality and environmental management

Where conflict arises, this specification prevails.

3. Service Conditions

- Rated voltage: 300/500 V or 600/1000 V depending on application
- Frequency: 50 Hz ± 2 %
- Continuous operating temperature: 70 °C for PVC insulation
- Installation: in conduits, trunking, panels, DBs and kiosks; some items may be exposed to outdoor conditions
- Ambient: –10 °C to +45 °C; RH up to 95 %; must be resistant to moderate chemical and salt-laden atmosphere typical of coastal environments

4. Construction Requirements

Single-Core House Wire

- Conductor: high-conductivity annealed copper, solid for 1.5 mm² and 2.5 mm², stranded for 4 mm² and above
- Insulation: PVC 300/500 V or 600/1000 V as required
- Typical sizes: 1.5, 2.5, 4, 6, 10 mm²
- Colours: red, black, blue, yellow/green (earth), white, as specified

Multi-Core Control Cable

- Conductor: stranded annealed copper
- Insulation: PVC 600/1000 V
- Bedding / Sheath: PVC (black or grey outer)
- Typical sizes: 1.5 mm² and 2.5 mm² cores
- Core counts: 2, 4, 7, 12, 19 cores or as required in BOQ
- Use: for control circuits, inter-panel wiring, auxiliary metering and protection

Flexible Cords

- Type: PVC-insulated, flexible stranded copper to SANS 1574
- Sizes: typically 3-core or 4-core, 1.5 mm² or 2.5 mm²

Initials of Service Provider's Authority: .....

- Use: for connections to portable equipment, test gear and auxiliary devices

Pilot / Signal Cables

- Where specified, shall be PVC-insulated copper, multi-core (e.g. 1.5 mm²) with tinned copper screen if required
- Used for pilot signalling and interlocking circuits

Marking

- Every metre of cable or wire to be marked with manufacturer's name, year of manufacture, conductor size, voltage rating and relevant SANS number

6. Tests and Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Type-tests on representative samples:
  - Conductor resistance at 20 °C
  - Insulation thickness and dielectric strength
  - Mechanical flexibility and elongation
- Routine-tests on each production batch:
  - Conductor resistance
  - Insulation integrity
- Certified test reports shall accompany each batch or drum
- The Municipality reserves the right to witness routine tests

7. Packaging and Delivery

- All wiring to be supplied in suitably sized drums or coils clearly labelled with manufacturer, conductor size, number of cores, length, voltage rating and standard reference
- Coils to be wrapped or bagged to prevent damage and moisture ingress
- Drum or coil lengths to suit site installation requirements

8. Documentation and Warranty

- Supplier to provide:
  - Type-test & routine-test certificates for each batch / drum / coil
  - Storage, transport & installation guidelines
  - Manufacturer's declaration of compliance with all relevant standards

Warranty: 12 months from installation or 18 months from delivery, whichever occurs first.
Any defective lengths shall be replaced at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 9: SPECIFICATIONS FOR DISTRIBUTION KIOSKS

1. Scope

Supply and deliver outdoor, fully pre-wired distribution kiosks for the municipal 230/400 V distribution network, including:

- Grey polyethylene kiosks in 4-way, 6-way, 9-way and 12-way double-door configurations for standard street and development distribution
- Grey 3CR12 stainless-steel double-door 12-way kiosk for heavy-duty or high-risk areas
- Pole-mounted polyethylene LV distribution boxes in 2-way, 3-way, 4-way and 12-way configurations.
- **All kiosks and boxes shall be supplied fully assembled, pre-wired up to the busbar and outgoing device terminals**, ready for connection to site cables.
- Kiosks shall be suitable for continuous outdoor service in coastal conditions

2. Applicable Standards

- SANS 1030 – Outdoor distribution kiosks and enclosures
- SANS 60947 – LV switchgear and controlgear
- SANS 1973 – Distribution board and panel construction
- SANS 1411-1 – Marking of electric equipment
- ISO 9001 / ISO 14001 – Quality and environmental management

Where conflict arises, this specification prevails.

3. Service Conditions

- Rated voltage: 230/400 V, 50 Hz
- Rated current: up to 800 A depending on kiosk size
- Ambient: –10 °C to +45 °C; RH up to 95 %
- All kiosks shall be resistant to UV, corrosion, moisture, impact, rodent ingress and vandalism
- Designed for coastal outdoor service

4. Construction Requirements

Polyethylene Kiosks

- Material: heavy-duty, UV-stabilised polyethylene, grey in colour
- Sizes: 4-way, 6-way, 9-way and 12-way, all double-door
- Ingress protection: IP54 minimum
- Doors: double-door with robust tamper-proof locking and stainless-steel hinges
- Ventilation: screened vermin-proof vents as required
- Base: suitable for mounting on a concrete plinth with provisions for cable entry and earthing
- Earthing: all metal fittings bonded to a common earth bar

Steel Kiosk

- Material: 3CR12 stainless-steel, grey in colour
- Size: 12-way, double-door configuration
- Protection: anti-corrosion finish with etch-primer and UV-resistant synthetic enamel coating
- Other construction features as per polyethylene kiosks above

General Requirements

- All kiosks to be supplied with durable rating plates indicating manufacturer, type, serial number, rated voltage, rated current and short-circuit withstand rating

Initials of Service Provider's Authority: .....

5. Electrical Equipment

- All kiosks and boxes shall be fully pre-wired in the factory up to the busbar and outgoing device terminals, tested prior to dispatch.
- Busbars: tin-plated copper, sized for rated current and short-circuit withstand.
- Outgoing protection: fuse-switch disconnectors (NH type) or MCCBs as required by the municipality.
- Incoming and outgoing terminals to accept cables up to 300 mm².
- Earthing bar provided for all cable screens and armour.
- Internal wiring tinned-copper, ferruled and neatly terminated.Metering compartment

6. Tests and Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Type-tests on a representative kiosk:
  - Temperature-rise of busbars
  - Dielectric withstand of insulation
  - Short-circuit withstand of busbars and connections
  - IP ingress protection and corrosion resistance
- Routine-tests on every kiosk prior to dispatch:
  - Insulation resistance
  - Functional verification of busbars, isolators and protection devices
- Certified test reports shall accompany each kiosk

7. Packaging and Delivery

- Kiosks to be delivered fully assembled, wired and tested
- Each unit to be securely packaged to prevent mechanical damage and moisture ingress during transport and storage
- Each kiosk to be clearly labelled with manufacturer, type, serial number and year of manufacture

8. Documentation and Warranty

- Supplier to provide:
  - Type-test and routine-test certificates for each unit
  - As-built wiring diagrams, installation and maintenance instructions
  - Declaration of compliance with all relevant standards

Warranty: 12 months from installation or 18 months from delivery, whichever occurs first.
Defective units to be repaired or replaced at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 10: SPECIFICATONS FOR NETWORK SWITCH DISCONNECTORS

1. Scope

Supply and deliver 11 kV outdoor gang-operated, pole-mounted, or indoor/kiosk-mounted load-break switch disconnectors for sectionalising and isolating municipal MV feeders.

- Devices shall be manual load-break type with integral earthing blades, rated as per BOQ.
- Indoor/kiosk-mounted units may be motorised as per BOQ.
- All units shall be suitable for continuous service in coastal environments.

2. Applicable Standards

- SANS 1885 / IEC 62271-102 – High-voltage AC disconnectors and earthing switches
- IEC 60265 / IEC 62271-103 – Load-break switches
- SANS 1874 – Pole-mounted switchgear
- ISO 9001 / ISO 14001 – Quality & environmental management

3. Service Conditions

- Rated voltage: 12 kV (Um = 12 kV)
- Frequency: 50 Hz ± 2 %
- Rated continuous current: 400 A, 630 A, 800 A (as per BOQ)
- Short-time withstand: 16 kA for 3 seconds
- Load-break capability: 200 A minimum
- Operating temperature: –10 °C to +45 °C, RH up to 95 %
- Installation: pole-mounted, pad-mounted, or kiosk-mounted (as per BOQ)

4. Construction Requirements

- Switch unit: 3-phase, gang-operated load-break with visible isolating gap
- Earthing switch: integral, interlocked, visible position (EARTH ON/OFF)
- Contacts: high-conductivity copper or silver-plated with arcing horns
- Insulators: UV-resistant outdoor-duty polymer or porcelain
- Enclosure (for indoor/kiosk types): IP54 min, galvanised steel or 3CR12 stainless steel, powder-coated
- Mechanism: manual handle, pad-lockable in ON/OFF; provision for motorisation (motorised for items A.7, A.8)
- Marking: rating plate showing manufacturer, type, current, voltage, short-circuit withstand, year

5. Accessories

- Mounting brackets and galvanised steel structures for pole installations
- Bimetallic lugs and termination accessories for conductor sizes in use
- Interlocks between switch and earth blades
- Ground-level visible position indicator (OPEN / CLOSED / EARTHED)

6. Tests and Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Type-tests on representative unit:
  – Temperature-rise, short-circuit withstand, load-break, mechanical endurance
- Routine-tests on each unit:
  – Dielectric withstand, contact resistance, mechanical operation
- Certified test reports shall accompany each unit

Initials of Service Provider's Authority: .....

7. Packaging and Delivery

- Switches delivered fully assembled, tested, with mounting hardware and instructions
- Securely packaged to prevent mechanical damage and moisture ingress
- Each unit labelled with manufacturer, type, serial number, year

8. Documentation and Warranty

- Supplier to provide:
  - Type- & routine-test certificates
  - Installation, operation & maintenance manuals
  - Declaration of compliance with standards

Warranty: 12 months after installation or 18 months after delivery, whichever occurs first.
Defective units replaced or repaired at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 11: SPECIFICATIONS FOR MEDIUM-VOLTAGE (MV) CIRCUIT BREAKERS

1. Scope

Supply and deliver 11 kV vacuum circuit breakers for use in municipal distribution substations.

- Indoor withdrawable vacuum breakers in arc-resistant metal-clad switchgear panels.
- Outdoor plinth-mounted vacuum breaker panels in weather-proof enclosures.
- All breakers must be compatible with the Municipality's existing panels and SCADA where required.

2. Applicable Standards

- IEC 62271-100 / SANS 62271-100 – AC circuit breakers
- IEC 62271-200 – Metal-enclosed switchgear up to 52 kV
- IEC 60255 series – Protection relays and control circuits
- IEC 60529 – Degree of protection (IP)
- ISO 9001 / ISO 14001 – Quality & environmental management

3. Service Conditions

- Rated voltage: 12 kV (Um)
- Frequency: 50 Hz ± 2 %
- Rated short-circuit breaking capacity: 16 kA for 3 s (as per BOQ)
- Rated continuous current: 630 A or 800 A (as per BOQ)
- Indoor units: metal-clad, arc-resistant panels
- Outdoor units: plinth-mounted, weather-proof, arc-resistant
- Ambient: –10 °C to +45 °C; RH up to 95 %; suitable for coastal service

4. Construction Requirements

- Breaker type: vacuum interruption
- Mounting: withdrawable for indoor panels, fixed for outdoor plinth-mounted units
- Enclosures:
  – Indoor: arc-resistant metal-clad cubicles
  – Outdoor: arc-resistant, weather-proof enclosures
- Operating mechanism: spring-charged, motor-charged for automatic reclosing
- Control voltage: 110 V AC / 220 V AC / DC as specified
- Auxiliary switches and contacts for remote indication and SCADA interfacing
- Earthing: provision for earthing blades and interlocks
- Clear, durable rating plate on each unit

5. Accessories

- Trip & closing coils, auxiliary contacts as required
- Motor-charged spring mechanism with manual emergency charging provision
- Local/remote selector switch, anti-pump relay
- Safety interlocks for operation and withdrawal
- Spares: 1 set of auxiliary contacts, trip coil & closing coil per 10 breakers supplied

Initials of Service Provider's Authority: .....

6. Tests and Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Type-tests: short-circuit breaking & making, temperature-rise, dielectric withstand, mechanical endurance (IEC 62271-100)
- Routine-tests: dielectric withstand, contact resistance, mechanical operation
- Test certificates to accompany every unit
- Municipality reserves the right to witness routine tests

7. Packaging and Delivery

- Breakers to be supplied complete and ready for installation
- Securely packed for storage and transport
- Each unit labelled with manufacturer, type, serial number, rated voltage/current, year of manufacture

8. Documentation and Warranty

- Supplier to provide:
  - Type-test & routine-test certificates
  - Installation, operation & maintenance manuals
  - Recommended spare-parts list

Warranty: 12 months after installation or 18 months after delivery, whichever occurs first.
Defective units shall be repaired or replaced at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 12: SPECIFICATIONS FOR LOW-VOLTAGE (LV) CIRCUIT BREAKERS

1. Scope

Supply and deliver low-voltage circuit breakers for use in distribution kiosks, mini-substations, LV switchboards and feeder pillars in the municipal 230/400 V distribution network.

Breakers shall be moulded-case (MCCB) or air circuit breakers (ACB) as specified in the BOQ and shall be suitable for coastal outdoor service when installed in sealed kiosks or indoor switchboards.

2. Applicable Standards

- IEC 60947-2 / SANS 60947-2 – LV circuit breakers
- IEC 60947-3 – Switch-disconnectors
- IEC 60947-4-1 – Motor circuit breakers where applicable
- IEC 60529 – Degrees of protection (IP)
- SANS 1411-1 – Marking of electric equipment
- ISO 9001 / ISO 14001 – Quality & environmental management

Where conflict arises, this specification prevails.

3. Service Conditions

- System voltage: 230/400 V, 50 Hz
- Rated current: typically 125 A, 250 A, 400 A, 630 A, 800 A, 1000 A, 1250 A as required by BOQ
- Breaking capacity: 25 kA, 36 kA, or 50 kA @ 400 V (as specified)
- Installation: in pre-wired kiosks, switchboards or feeder pillars
- Ambient: –10 °C to +45 °C, RH up to 95 %, suitable for coastal outdoor environments when enclosed
- Devices shall operate correctly under normal utility supply conditions

4. Construction Requirements

- Type: MCCB for ratings up to about 800 A; ACB for higher ratings where required
- Poles: 3-pole or 4-pole as specified
- Trip unit:
  – Thermal-magnetic or electronic, providing overload and short-circuit protection
  – Adjustable long-time, short-time, instantaneous and (if required) earth-fault settings
- Mounting: fixed or withdrawable, as required by the kiosk or switchboard design
- Terminals: suitable for copper or aluminium conductors up to 300 mm², with bi-metallic pads or compression lugs
- Auxiliary contacts: provide open/close contacts as required for SCADA or remote indication
- Control voltage for shunt-trip / closing coil: 110 V AC or 220 V AC/DC as specified
- Marking: durable rating plate showing manufacturer, model, serial number, rated current, breaking capacity and year of manufacture

5. Accessories

- Shunt-trip, closing coils and under-voltage releases as required
- Mechanical interlocks or pad-lockable handles for safe isolation
- Motorised operators for ACBs where specified
- Spare auxiliary contacts and trip coils (one set for every ten breakers supplied)

Initials of Service Provider's Authority: .....

- Suitable terminal covers and arc-chutes for personnel safety

6. Tests & Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Type-tests: to IEC 60947-2 including breaking capacity, temperature rise, dielectric withstand and mechanical endurance
- Routine-tests: to IEC 60947-2 including contact resistance, dielectric withstand and mechanical operation
- Certified test certificates shall accompany each breaker

7. Packaging & Delivery

- Breakers to be delivered complete and ready for installation
- Packed in robust cartons or crates with suitable internal protection against moisture and impact
- Each breaker to be clearly labelled with manufacturer, model, rating and serial number

8. Documentation & Warranty

- Supplier shall provide:
  - Type-test and routine-test certificates for each model supplied
  - Installation, operation and maintenance instructions
  - Recommended spare-parts list

Warranty: 12 months from installation or 18 months from delivery, whichever occurs first.
Defective units shall be repaired or replaced at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 13: SPECIFICATIONS FOR MINIATURE CIRCUIT BREAKERS (MCBs) & EARTH LEAKAGE DIVICES

1. Scope
Supply and deliver miniature circuit breakers (MCBs) and earth-leakage protection devices for outgoing feeders and service circuits in kiosks, feeder pillars, distribution boards and control panels on the 230/400V municipal network.

2. Applicable Standards
- IEC / SANS 60898-1 – MCBs for household and similar use (≤ 125 A)
- IEC / SANS 60947-2 – MCBs for industrial use
- IEC / SANS 61008-1 – RCCBs (earth-leakage without over-current protection)
- IEC / SANS 61009-1 – RCBOs (earth-leakage with over-current protection)
- SANS 10142-1 – Wiring code
- ISO 9001 / 14001 – Quality and environmental management

Where conflict arises, this specification prevails.

3. Service Conditions
- System voltage: 230/400 V, 50 Hz
- Installation: indoors in boards or enclosed in outdoor kiosks/feeder pillars
- Ambient: –10 °C to +45 °C, relative humidity up to 95 %, suitable for coastal conditions

4. MCB Requirements
- Breaking capacity: as scheduled in BOQ — typically 3 kA or 6 kA @ 230/400 V
- Rated current range: typically 6 A – 63 A, including 32 A and 63 A
- Tripping curves:
  – C-curve (standard for general feeders)
  – B-curve (for lighting / sensitive loads)
  – D-curve (for motors / high inrush loads)
- Poles: 1-pole, 2-pole, 3-pole or 4-pole as required
- Each MCB shall be clearly marked with manufacturer, model, rating, breaking capacity (kA), curve, poles and compliance standard

5. Earth-Leakage Devices
- RCCB: 2-pole (1-phase) and 4-pole (3-phase) devices in In 25 A – 125 A
- RCBO: 1P+N and 3P+N devices in In 6 A – 63 A
- Residual current sensitivity (IΔn):
  – 30 mA for personal protection (socket / final circuits)
  – 100 mA for distribution circuits
  – 300 mA for fire protection where permitted by SANS 10142-1
- Time-delay (S-type) units shall be provided where required for selectivity
- Devices shall have adequate short-circuit withstand and be coordinated with upstream breakers

6. Accessories & Installation
- Provide all necessary busbar combs, phase barriers, blanking plates, terminal covers and pad-lockable handles as required
- Each earth-leakage device shall include a test button and be labelled with circuit designation

Initials of Service Provider's Authority: .....

7. Tests & Quality Assurance

- Manufacturer shall be ISO 9001-certified
- All devices shall have valid type-test certificates to the relevant IEC/SANS standard
- Devices shall undergo routine factory tests in accordance with the same standards
- Certified test certificates shall accompany each shipment

8. Packaging & Delivery

- Supplied in original manufacturer's packaging with clear labelling for rating, curve, kA and IΔn
- Packaging shall provide adequate protection against moisture and mechanical damage
- Include manufacturer's data sheets for each product range supplied

9. Documentation & Warranty

- Supplier shall provide:
  - Conformity certificates and test reports
  - Installation and operating instructions

Warranty: 12 months from installation or 18 months from delivery, whichever comes first.
Defective devices shall be replaced or repaired at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 14: SPECIFICATIONS FOR TERMINATIONS, JOINTS, CLAMPS & CONNECTING DEVICES (CABLES – HEAT-SHRINK

1. Scope

Supply and deliver heat-shrinkable termination kits, jointing kits, clamps, lugs, ferrules and related accessories for use on the Municipality's 11 kV medium-voltage and 230/400 V low-voltage cable networks.

Kits shall be complete and ready for field installation, including all insulating, sealing and mechanical components.

2. Applicable Standards

- IEC / SANS 60502-4 – Accessories for power cables
- IEC / SANS 61238-1 – Compression and mechanical connectors
- IEC / SANS 60099-4 – Surge arresters where included
- SANS 1213 / 1332 – Cable lugs and ferrules
- ISO 9001 / 14001 – Quality and environmental management
- All materials shall be tested and approved for use on XLPE and PILC cables as applicable

3. Service Conditions

- Voltage levels: 11 kV MV and 230/400 V LV
- Outdoor and indoor use in kiosks, feeder pillars, pole-mount and ground-mount installations
- Coastal and high-humidity environment
- Operating temperature: –10 °C to +45 °C
- Suitable for use with both copper and aluminium conductors

4. Termination Kits

- Indoor terminations: designed for dry-type switchgear / panel terminations; shall include stress-control tubing, insulating tubing, sealing boots and all hardware
- Outdoor terminations: UV-resistant and weather-proof; shall include stress-control components, heat-shrink insulating and sealing tubes, rain sheds and all hardware
- Rated for cables up to 12 kV (Um) and compatible with XLPE or PILC cable types of the specified cross-section

5. Jointing Kits

- Suitable for straight-through joints on XLPE or PILC cables (11 kV and LV)
- Heat-shrink technology with stress-control and moisture-seal layers
- For PILC-to-XLPE transitions, kits shall include required insulating and mechanical transition sleeves
- All kits shall be supplied with the necessary compression connectors, screen continuity, sealing and protective components

6. Cable Lugs, Ferrules & Connectors

- Compression lugs and ferrules: high-conductivity tinned copper or bi-metallic (for Al-Cu transition) in sizes matching BOQ cables
- Mechanical connectors and shear-bolt lugs: permitted where specified and rated for 11 kV use
- All components to comply with IEC / SANS 61238-1
- Supplied in correct size and type for conductor cross-sections listed in the BOQ

Initials of Service Provider's Authority: .....

7. Clamps & Supporting Hardware

- Outdoor termination support clamps, wall / pole brackets, earth bond clamps and screen earthing kits to be included where required
- Hardware to be hot-dip galvanised or stainless steel for corrosion resistance

8. Installation Guidance

- Kits shall include comprehensive illustrated installation instructions
- Shall be installable with standard heat-shrink tools and compression crimping equipment
- No special curing or adhesives to be required beyond that supplied in the kit

9. Tests & Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Kits and components shall have valid type-test certificates demonstrating compliance with the above IEC/SANS standards
- Each kit shall be routine-tested for insulation integrity, partial discharge and dimensions
- Certified test certificates shall accompany each batch supplied

10. Packaging & Delivery

- Kits to be supplied in sealed moisture-proof packs clearly labelled with:
  - Cable voltage class
  - Conductor range
  - Cable type (XLPE or PILC)
  - Manufacturer and batch number
- All connectors, tubes, mastics, tapes and instructions shall be included in each kit

11. Documentation & Warranty

- Supplier shall provide installation manuals, conformity certificates and recommended spare list
- Warranty: 12 months from installation or 18 months from delivery, whichever occurs first
- Defective components to be replaced at supplier's cost

Initials of Service Provider's Authority: .....

ITEM 15: SPECIFICATIONS FOR CONNECTING DEVICES (LINES)

1. Scope
Supply and deliver mechanical connecting devices, clamps, joints and fittings for use on the Municipality's overhead MV and LV line networks (AAAC, ACSR, copper, and ABC conductors).

All items shall be suitable for distribution line installation in coastal environments and for the voltages and conductor sizes stated in the BOQ.

2. Applicable Standards
- IEC / SANS 61238-1 – Compression & mechanical connectors for power conductors
- SANS 182-1 / 182-2 / 182-3 – Overhead line hardware and fittings
- SANS 1213 – Copper lugs & ferrules
- SANS 1411-1 – Marking of electrical equipment
- ISO 9001 / 14001 – Quality & environmental management
- All hot-dip galvanising to comply with SANS 121

3. Service Conditions
- Rated for 11 kV MV and 230/400 V LV overhead lines
- Compatible with AAAC, ACSR, copper, and ABC conductors as specified in the BOQ
- Outdoor use in coastal, high-humidity, UV-exposed conditions
- Operating temperature: –10 °C to +45 °C

4. Compression & Mechanical Connectors
- Compression sleeves / joints:
  - – High-conductivity aluminium or bi-metallic for Cu–Al transitions
  - – Suitable for conductor sizes listed in the BOQ (e.g. 16 mm^2 – 300 mm^2)
  - – Shall comply with IEC / SANS 61238-1 and be marked with conductor size and manufacturer's ID
- Mechanical (shear-bolt) connectors:
  - – Allowed where compression tools are impractical
  - – Rated for full mechanical & electrical performance at line fault levels

5. Clamps & Line Hardware
- PG (Parallel-Groove) clamps for jumper connections and tee-offs
- Suspension clamps for conductor support at intermediate poles
- Dead-end / tension clamps for conductor terminations at strain poles and equipment
- Hot-line / tapping clamps where specified for live-line connections
- All clamps to be of corrosion-resistant alloy or hot-dip galvanised steel and designed for conductor sizes listed in BOQ

6. ABC (Aerial Bundle Conductor) Hardware
- Insulation-piercing connectors (IPC) for service taps and branching
- Anchoring / tension clamps for ABC dead-ends
- Suspension clamps & brackets for intermediate pole support
- All ABC fittings shall be UV-resistant polymeric or corrosion-resistant metallic, suitable for outdoor use

Initials of Service Provider's Authority: .....

7. Earth-Bonding & Accessories

- Earth bond clamps for connection to galvanised earth rods or earthing points
- Bonding straps for pole-mounted equipment and screens
- All fasteners and brackets to be hot-dip galvanised steel or stainless steel for corrosion resistance

8. Installation Guidance

- Compression fittings shall be compatible with standard hydraulic crimping tools
- Mechanical connectors and IPCs shall be supplied complete with installation instructions
- Torque settings, shear-bolt values or compression die sizes shall be clearly indicated on each item or its packaging

9. Tests & Quality Assurance

- Manufacturer shall be ISO 9001-certified
- All fittings shall have valid type-test certificates (mechanical strength, electrical resistance, thermal endurance, corrosion resistance) to the above standards
- Each batch shall be routine-tested for dimensions and mechanical properties
- Certified test certificates shall accompany every delivery batch

10. Packaging & Delivery

- All connectors and clamps shall be supplied in sealed, moisture-resistant packs clearly marked with:
  – Conductor type and size
  – Voltage class (MV or LV)
  – Manufacturer and batch number
- Hardware such as brackets, bolts and nuts shall be bagged and tagged per item type and size

11. Documentation & Warranty

- Supplier shall provide installation guidelines, conformity certificates and test reports
- Warranty: 12 months from installation or 18 months from delivery, whichever occurs first
- Defective items shall be replaced at supplier's cost.

Initials of Service Provider's Authority: .....

ITEM 16: SPECIFICATINS FOR CONNECTING DEVICES (LV CABLES)

1. Scope
Supply and deliver connecting devices for low-voltage (230/400 V) underground cables, including lugs, ferrules, mechanical connectors, insulation-piercing connectors (IPC), joints, terminations and earth-bonding accessories for use in kiosks, feeder pillars, mini-substations, distribution boards and underground reticulation networks.

2. Applicable Standards
- IEC / SANS 60502-4 – Cable accessories for LV power cables
- IEC / SANS 61238-1 – Compression and mechanical connectors for power cables
- IEC / SANS 60998 / 60999 – Connecting devices for low-voltage installations
- SANS 1213 / 1332 – Copper and aluminium lugs and ferrules
- SANS 1411-1 – Marking of electrical equipment
- ISO 9001 / 14001 – Quality & environmental management

Where conflict arises, this specification prevails.

3. Service Conditions
- System voltage: 230/400 V, 50 Hz
- For use with PVC or XLPE insulated copper or aluminium conductors up to 400 mm² (sizes as specified in BOQ)
- Suitable for indoor or outdoor installations in kiosks, feeder pillars, cabinets or direct-buried underground reticulation
- Ambient temperature: –10 °C to +45 °C, relative humidity up to 95 %, suitable for coastal environments

4. Lugs and Ferrules
- Tinned copper compression lugs for copper conductors
- Bi-metallic compression lugs for aluminium-to-copper connections
- Ferrules for multi-stranded copper conductors
- All compression types shall comply with IEC / SANS 61238-1
- Each lug / ferrule shall be clearly marked with conductor size and manufacturer's ID

5. Mechanical Connectors
- Shear-bolt connectors or mechanical lugs may be supplied where compression tools are impractical or where Cu-Al transitions are required
- Shall be rated for full mechanical and electrical performance at LV service fault levels
- Shall be tested and certified for use on LV underground cables

6. Heat-Shrink Terminations
- For indoor or outdoor termination of LV underground cables in kiosks, feeder pillars, DBs
- Shall include heat-shrink insulation, sealing boots, stress-relief components and all necessary accessories
- Outdoor types shall be UV-resistant, weather-proof and moisture-sealed

Initials of Service Provider's Authority: .....

7. Straight-Through Joint Kits

- For joining two lengths of LV underground cable
- Shall be heat-shrink or resin-cast type, suitable for PVC or XLPE insulation
- Must include appropriate mechanical or compression connectors, insulation, moisture seal, armour and screen continuity components

8. Insulation-Piercing Connectors (IPCs)

- For tapping LV ABC (aerial bundle conductor) to LV underground cable or branching between ABC feeders
- Shall comply with SANS / IEC 61238-1 and be tested for continuous load at 230/400 V
- Shall maintain insulation integrity and be rated IP 54 or better for outdoor service

9. Earth-Bond Clamps and Accessories

- For bonding cable screens and armour to earth bars in kiosks, feeder pillars and DBs
- Shall be corrosion-resistant (tinned copper, stainless steel or brass)
- All outdoor fasteners and brackets shall be hot-dip galvanised or stainless steel

10. Installation Guidance

- All devices shall be supplied with illustrated installation instructions
- Compression connectors shall be compatible with standard hydraulic crimping tools
- Heat-shrink kits shall be installable using standard heat-shrink torches with no special curing requirements

11. Tests & Quality Assurance

- Manufacturer shall be ISO 9001-certified
- All devices shall have valid type-test certificates in accordance with the relevant IEC / SANS standards
- Each batch shall be routine-tested for dimensional accuracy, mechanical strength and insulation resistance
- Certified test certificates shall accompany each delivery batch

12. Packaging & Delivery

- Supplied in sealed, moisture-proof, clearly labelled packs indicating:
  - Conductor size and type (Cu / Al)
  - Cable insulation type (PVC / XLPE)
  - Voltage rating
  - Manufacturer and batch number
- All kits shall include all required components and consumables

13. Documentation & Warranty

- Supplier shall provide conformity certificates, test reports and installation manuals
- Warranty: 12 months from installation or 18 months from delivery, whichever occurs first
- Defective devices shall be replaced at the supplier's cost

Initials of Service Provider's Authority: .....

ITEM 17: SPECIFICATIONS FOR SURGE ARRESTERS & LIGHTING PROTECTION

1. Scope
Supply and deliver surge arresters and lightning protection devices for use on the Municipality's 11 kV overhead and underground networks, mini-substations, kiosks, and feeder pillars, to protect plant and equipment from transient over-voltages due to lightning or switching surges.

2. Applicable Standards
- IEC / SANS 60099-4 – Metal-oxide surge arresters for AC power systems
- IEC / SANS 60099-5 – Selection and application recommendations
- IEC / SANS 60071-1 / 60071-2 – Insulation co-ordination and over-voltage protection
- IEC / SANS 62561 series – Components for lightning protection systems
- IEC / SANS 62305 series – Lightning protection of structures
- ISO 9001 / 14001 – Quality & environmental management
- SANS 121 – Hot-dip galvanising of steel components

Where conflict arises, this specification prevails.

3. Service Conditions
- System voltage: 11 kV network, 230/400 V LV
- Outdoor installation in coastal, high-humidity, pollution-prone environment
- Continuous service temperature: –10 °C to +45 °C
- Minimum creepage distance and pollution performance suitable for Class III coastal areas
- All external metallic components shall be corrosion-resistant (hot-dip galvanised steel or stainless steel)

4. Surge Arresters for MV Network
- Type: gapless, metal-oxide (ZnO) surge arresters without series gaps
- Rated voltage (Ur): to suit 11 kV (Um 12 kV) network (e.g. Ur = 9 kV or 10 kV)
- Continuous operating voltage (Uc): not less than 80 % of Ur
- Rated discharge current: 10 kA (8/20 µs) minimum
- Energy handling & thermal stability: adequate for repeated lightning surges and temporary over-voltages
- Housing: outdoor polymeric (silicone or EPDM) or porcelain, with UV and pollution resistance
- Mounting: pole-mounted or in kiosk/mini-substation as required; shall include galvanised steel mounting brackets, line and earth terminals

5. Surge Arresters for LV Network
- Rated voltage: to suit 230/400 V systems (typically 275 V phase-to-neutral)
- Surge current rating: minimum 20 kA (8/20 µs) per mode
- Class: Type 1 / Type 2 SPD combination as required for service entrance of kiosks and feeder pillars
- Shall be pluggable or modular cartridge type for easy replacement
- Shall include status indicators and remote signalling contact where specified

Initials of Service Provider's Authority: .....

6. Lightning Protection Components

- Air-termination rods / finials: aluminium or copper, 16 mm Ø min.
- Down-conductors: copper or aluminium strip / cable of cross-section ≥ 25 mm² Cu or equivalent
- Earth-termination system: earth rods of copper-bonded steel, 16 mm Ø × 2.4 m min., with corrosion-resistant clamps and inspection pits
- Bonding conductors & clamps: as per IEC / SANS 62561, hot-dip galvanised or stainless steel for outdoor service
- Components shall be mechanically robust and corrosion-resistant for coastal installation

7. Accessories

- Each arrester set to be supplied with:
  - Mounting brackets and hardware suitable for pole or wall/kiosk installation
  - Earthing leads, clamps and tags as required
- For LV SPDs: provide disconnecting devices / fuses as recommended by the manufacturer

8. Tests & Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Surge arresters shall be type-tested to IEC 60099-4, including:
  - Residual voltage
  - Energy handling
  - Long-duration current impulse
  - Pressure-relief and short-circuit behaviour
- Lightning protection components shall comply with IEC 62305 / IEC 62561 for mechanical strength, corrosion resistance and continuity
- Routine-tested for leakage current and visual inspection at factory
- Certified test certificates shall accompany each batch supplied

9. Packaging & Delivery

- Arresters to be supplied in sealed, moisture-proof cartons, clearly labelled with:
  - Rated voltage and class
  - Manufacturer, model, batch number
  - Installation orientation (if applicable)
- Mounting hardware, clamps and earth leads to be bagged and tagged by item type and size

10. Documentation & Warranty

- Supplier shall provide installation instructions, conformity certificates, test reports and recommended maintenance guidelines
- Warranty: 12 months from installation or 18 months from delivery, whichever occurs first
- Defective items shall be replaced at the supplier's cost

Initials of Service Provider's Authority: .....

ITEM 18: SPECIFICATIONS FOR 11 Kv LINE CONSTRUCTION - HARDWARE

1. Scope
Supply and deliver mechanical hardware for 11 kV overhead line construction, including pole-top fittings, cross-arms, brackets, stays, bolts, nuts and associated components suitable for AAAC, ACSR or copper conductors as specified in the BOQ.

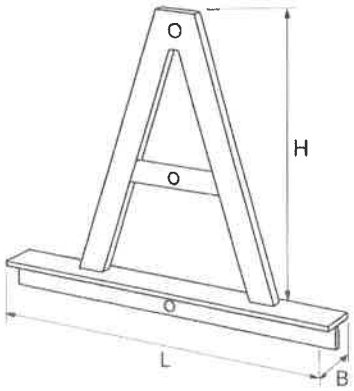
2. Applicable Standards
- SANS 182-1 / 182-2 / 182-3 – Overhead line hardware and fittings
- IEC / SANS 61284 – Overhead line fittings – Requirements and tests
- SANS 121 – Hot-dip galvanising
- ISO 9001 / 14001

3. Service Conditions
- Rated for 11 kV (Um 12 kV) overhead lines
- Suitable for coastal, polluted and high-humidity environments
- Mechanical life expectancy ≥ 50 years under normal service conditions

4. Requirements
- All steelwork hot-dip galvanised after fabrication to SANS 121
- All bolts, nuts, spring washers, flat washers – galvanised high-tensile steel
- All fittings to be mechanically robust, corrosion-resistant and compatible with standard 11 kV insulators and conductors

4.1 A-Type Strain & Intermediate Brackets
- Hot-dip galvanised steel angle bracket for strain or angle poles on wooden-pole 11 kV lines
- Supplied complete with pole-mounting bolts, washers and locking devices
- Compatible with AAAC, ACSR or copper conductors
- Designed to take full line tension at dead-ends or sharp angles

Only for Illustration Purposes



A-TYPE STRAIN BRACKET
Hot-dip galvanized steel

Initials of Service Provider's Authority: .....

4.2 Standard Cross-Arm Assembly for Intermediate Poles

- Length: 1.9 m nominal (acceptable range 1.8–2.1 m) for three-phase 11 kV construction.
- Includes pole-mounting brackets, bolts, washers and locking devices
- Used at intermediate (suspension) pole positions to carry conductors under normal running tension
- Compatible with standard SANS-approved insulators and conductor clamps

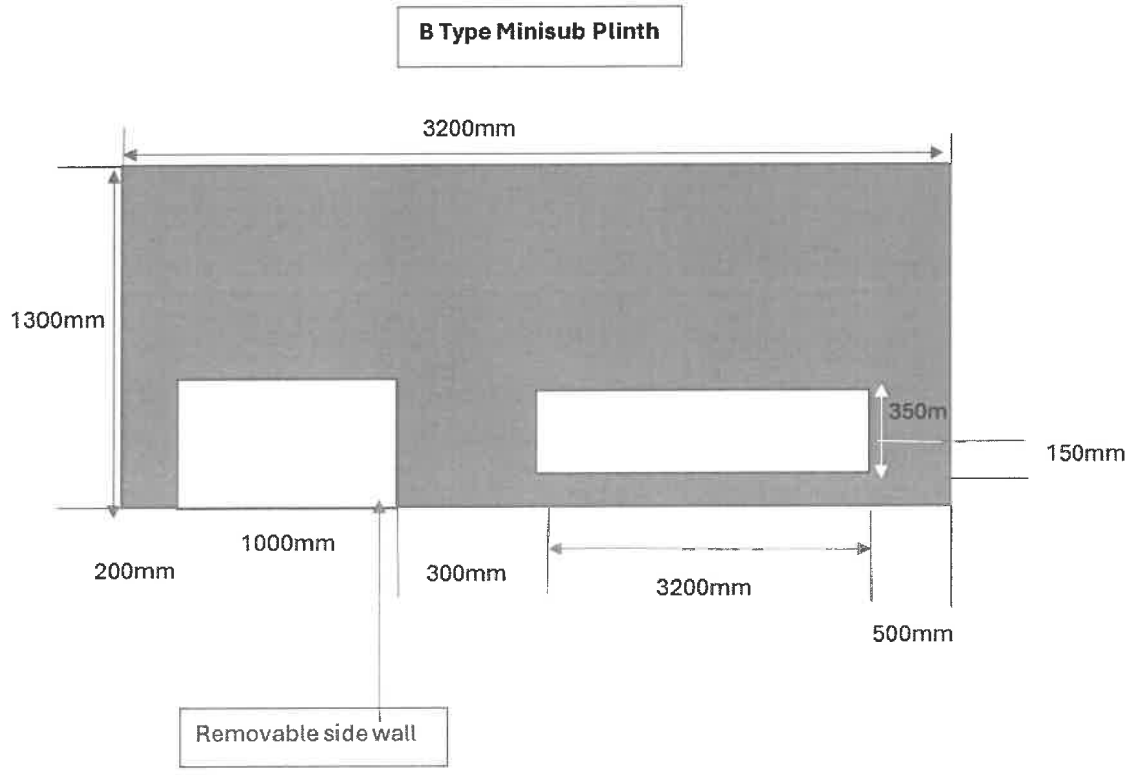
4.3 Stays and Ancillary Fittings

- Galvanised steel stay-rods, stay-plates, stay-insulators and thimbles as per standard SANS line-construction practice
- Sizes as per BOQ for 11 kV lines

4.4 Pre-Cast Concrete Plinths

B-Type Mini-Sub Plinth with Removable Side Wall

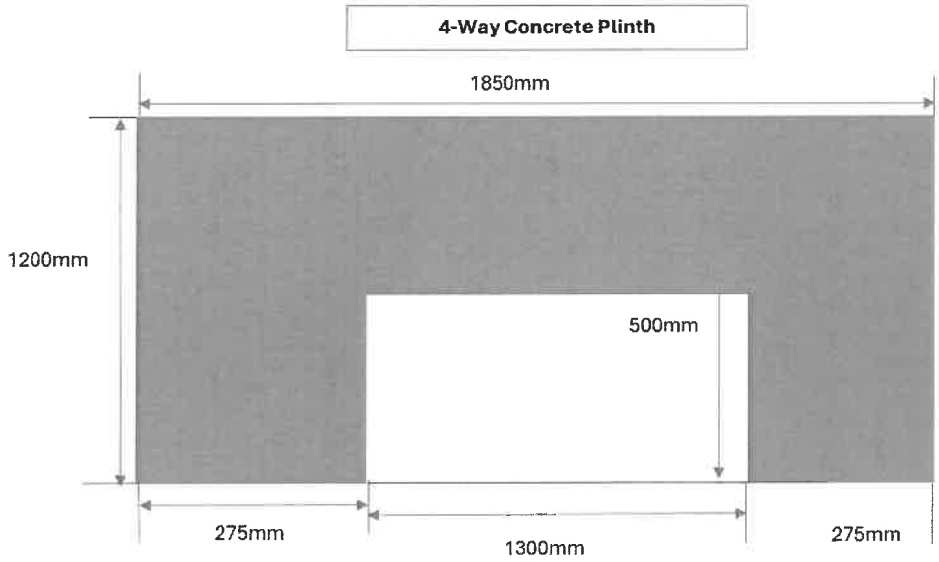
- Concrete strength: 25–30 MPa
- Reinforced with Y12 steel bars in both directions
- 2 × cast-in lifting holes
- Dimensions: 3 200 mm × 1 300 mm × 300 mm
- Includes removable side wall for front cable access



4-Way Concrete Plinth (for kiosks / RMUs)

Initials of Service Provider's Authority: .....

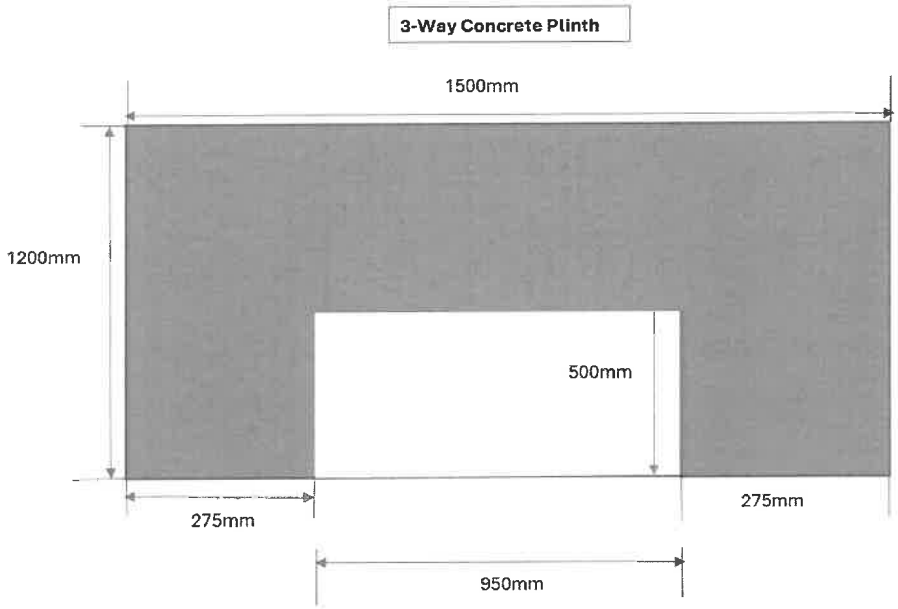
- Concrete strength: 25–30 MPa
- Reinforced with Y12 steel bars in both directions
- 2 × cast-in lifting holes
- Dimensions: 1 850 mm × 1 200 mm × 300 mm



3-Way Concrete Plinth (for kiosks / RMUs)

- Concrete strength: 25–30 MPa
- Reinforced with Y12 steel bars in both directions
- 2 × cast-in lifting holes

Initials of Service Provider's Authority: .....



- Dimensions: 1 500 mm × 1 200 mm × 300

5. Tests & QA

- Manufacturer shall be ISO 9001-certified
- Type-tested to IEC / SANS 61284 / 182 for mechanical strength and corrosion resistance
- Routine-tested for dimensional accuracy and galvanising thickness
- Certified test certificates to accompany each batch

6. Packaging & Delivery

- Supplied in bundled or boxed lots, labelled by component type and quantity
- Small items (bolts, washers) to be bagged and tagged
- Packaging to protect against corrosion and mechanical damage

7. Documentation & Warranty

- Supplier to provide conformity certificates and test reports
- Warranty: 12 months from installation or 18 months from delivery

Initials of Service Provider's Authority: .....

ITEM 19: SPECIFCATIONS FOR 11 kV LINE CONSTRUCTION - CONNECTORS

1. Scope
Supply and deliver electrical connectors for 11 kV overhead lines, including compression joints, PG-clamps, hot-line clamps and mechanical connectors for AAAC, ACSR or copper conductors.

2. Applicable Standards
- IEC / SANS 61238-1 – Compression & mechanical connectors
- IEC / SANS 61284 – Overhead line fittings
- SANS 121 – Hot-dip galvanising
- ISO 9001 / 14001

3. Service Conditions
- Rated for 11 kV (Um 12 kV)
- Suitable for coastal, high-humidity and polluted environments
- Compatible with conductor sizes as listed in the BOQ
- Shall withstand rated mechanical tension, thermal cycling and fault currents

4. Requirements
- Compression sleeves / joints: aluminium or bi-metallic (Cu-Al) for permanent splices
- PG-clamps: aluminium alloy with galvanised bolts and stainless spring washers for jumper and tee-off connections
- Hot-line / tapping clamps: approved for live-line work
- Shear-bolt connectors: permitted for field use and tested for full mechanical and electrical performance
- All connectors to have low resistance, high strength and corrosion resistance

5. Tests & QA
- Manufacturer shall be ISO 9001-certified
- Type-tested for electrical resistance, temperature rise, tensile strength, thermal cycling and corrosion resistance
- Routine-tested for dimensional accuracy and galvanising
- Certified test certificates to accompany each batch

6. Packaging & Delivery
- Supplied in sealed, moisture-proof packs, labelled with conductor size, type (AAAC / ACSR / Cu), voltage class and batch number
- Small parts to be bagged and tagged

7. Documentation & Warranty
- Supplier to provide installation instructions, conformity certificates and test reports
- Warranty: 12 months from installation or 18 months from delivery

Initials of Service Provider's Authority: .....

ITEM 20: SPECIFICATIONS FOR 11 kV LINE CONSTRUCTION – PREFORMED PRODUCTS

1. Scope
Supply and deliver pre-formed line fittings such as dead-end grips, suspension ties, armour rods, and guy grips for stay assemblies for 11 kV overhead lines.

2. Applicable Standards
- IEC / SANS 61284 – Overhead line fittings
- ISO 9001 / 14001

3. Service Conditions
- Rated for 11 kV (Um 12 kV)
- Suitable for AAAC, ACSR or copper conductors as per BOQ
- Designed for coastal, polluted and UV-exposed environments

4. Requirements
- Pre-formed dead-end grips: provide full mechanical and electrical performance without damaging the conductor
- Pre-formed suspension clamps / ties: support conductor at intermediate poles and reduce vibration fatigue
- Pre-formed armour rods: protect conductor against abrasion at suspension points
- Pre-formed guy grips: suitable for specified stay-wire sizes (e.g. 7/4.00 mm), providing full rated strength without damaging the wire
- All fittings shall be made of high-strength aluminium alloy or galvanised steel, clearly marked with conductor size and manufacturer's ID

5. Tests & QA
- Manufacturer shall be ISO 9001-certified
- Type-tested to IEC / SANS 61284 for mechanical strength, slip load and electrical continuity
- Routine-tested for dimensional conformity and coating quality
- Certified test certificates shall accompany each batch

6. Packaging & Delivery
- Supplied in bundled, moisture-protected cartons, labelled with conductor size, type and batch number

7. Documentation & Warranty
- Supplier to provide conformity certificates and test reports
- Warranty: 12 months from installation or 18 months from delivery

Initials of Service Provider's Authority: .....

ITEM 21: SPECIFICATIONS FOR 11 KV LINE & CABLE ACCESSORIES

1. Scope

Supply and deliver a full range of **cable installation, securing and identification accessories** for use with low-voltage (LV) and medium-voltage (MV) underground and overhead distribution systems.
The accessories shall be suitable for use in kiosks, feeder pillars, mini-substations, poles, trenches and underground installations, and shall include the following as listed in the BOQ:

- UV-resistant nylon cable ties in various sizes for general LV and MV use.
- Stainless-steel cable ties and banding for heavy-duty outdoor applications in corrosive environments.
- Galvanised binding wire for bundling and securing cables.
- Cable cleats and clamps (PVC or aluminium) for safe securing of LV and MV cables on trays, poles and structures.
- Temporary insulated cable hangers and hooks for cable-laying works.
- Identification accessories including wrap-around PVC cable markers (numbered), printable heat-shrink sleeves, plastic marker plates and buried cable marker pegs.
- Protective accessories including PVC split ducts, underground cable marker tapes (standard yellow and conductive types) for trench installations.

2. Applicable Standards

All materials supplied under this item shall comply with the latest editions of the relevant IEC / SANS and ISO standards, including but not limited to:

- IEC 62275 / SANS equivalent – Cable management systems for cable ties and fixing devices.
- IEC 61914 – Cable cleats for electrical installations.
- IEC / SANS 60092-370 or equivalent – Heat-shrinkable sleeves for cable marking.
- SANS 182 series – Overhead and underground line hardware and fittings.
- SANS 121 – Hot-dip galvanising of steel components.
- SANS 12252 (or equivalent) – Underground cable warning and marker tapes.
- ISO 9001 – Quality management systems.
- ISO 14001 – Environmental management systems.

Where there is any conflict between the standards and this specification, this specification shall prevail.

3. Service Conditions

- Rated for 11 kV (Um 12 kV)
- Suitable for coastal, high-humidity and polluted environments
- All components to be mechanically robust and corrosion-resistant

4. Requirements

- Line post and suspension insulators: porcelain or polymeric, creepage distance suitable for coastal duty
- Stay assemblies: complete with galvanised stay rods (min. 19 mm Ø), stay plates, bow shackles, thimbles, turnbuckles, strain insulators and stay wires (e.g. 7/4.00 mm or as specified)
- Stay guards: high-visibility plastic or galvanised sheet to improve public safety at ground level
- Earth rods and clamps: copper-bonded steel rods (min. 16 mm Ø × 2.4 m), galvanised or brass clamps
- Vibration dampers: spiral or Stockbridge type for specified conductor sizes
- Conductor spacers and ties: as required by line design
- All metallic components to be hot-dip galvanised or stainless steel

Initials of Service Provider's Authority: .....

5. Tests & QA

- Manufacturer shall be ISO 9001-certified
- Type-tested to the relevant IEC / SANS standards for mechanical strength, electrical performance and environmental durability
- Routine-tested for dimensional accuracy and galvanising thickness
- Certified test certificates shall accompany each batch

6. Packaging & Delivery

- Supplied in bundled or boxed lots, labelled with description, size, voltage class and batch number
- Small fittings and fasteners to be bagged and tagged

7. Documentation & Warranty

- Supplier to provide conformity certificates, test reports and installation instructions
- Warranty: 12 months from installation or 18 months from delivery

Initials of Service Provider's Authority: .....

ITEM 22: SPECIFICATIONS FOR MEDIUM-VOLTAGE (MV) FUSES

1. Scope
Supply and deliver medium-voltage fuse links and associated drop-out cut-out assemblies for use in the Municipality's 11 kV overhead distribution lines, pole-mounted transformer protection and MV switchgear.

2. Applicable Standards
- IEC / SANS 60282-1 – High-voltage current-limiting fuses
- IEC / SANS 60282-2 – Expulsion-type fuse links for outdoor use
- IEC / SANS 60644 – Fuse-links for transformer protection (E-type / gTr characteristics)
- SANS 1411-1 – Marking of electrical equipment
- ISO 9001 / 14001 – Quality and environmental management

3. Service Conditions
- Rated for use on 11 kV (Um 12 kV), 50 Hz AC distribution networks
- Installed outdoors on poles or indoors in switchgear
- Coastal, high-humidity and polluted environments
- Operating temperature: –10 °C to +45 °C

4. Drop-Out Cut-Out Fuse Assemblies
- Type: expulsion-type drop-out fuse cut-out
- Insulator: porcelain or polymeric, suitable for UV-exposed coastal outdoor service
- Fuse tube: arc-extinguishing expulsion tube with stainless-steel and tinned-copper end fittings
- Mounting hardware: hot-dip galvanised steel brackets, live-line replaceable design
- Shall provide visible isolation when the fuse link operates
- Rated voltage: 12 kV
- Continuous current rating: 200 A or as specified in BOQ
- Mechanical strength adequate for pole-top installation

5. Current-Limiting MV Fuse Links
- Type: high-rupturing capacity (HRC) current-limiting fuses for indoor or enclosed switchgear and for back-up protection of transformers
- Rated voltage: 12 kV
- Rated current: as per BOQ (e.g. 31.5 A, 50 A, 63 A, 80 A, 100 A, 125 A)
- Breaking capacity: ≥ 50 kA symmetrical at rated voltage
- Shall have E-type / gTr time-current characteristics suitable for transformer protection
- Shall be interchangeable with standard holders used in common switchgear brands (e.g. ABB, Schneider, Nulec, Bussmann)
- Fuse elements shall be silver or silver-copper, with high-speed interruption and low-power loss
- Each fuse shall be clearly marked with manufacturer, rated current, voltage and type

6. Accessories
- Provide spare fuse links – minimum 5 % of supplied quantity for each rating
- Provide galvanised mounting brackets, contact clamps and earthing hardware with each drop-out assembly
- Supply installation, handling and safety instructions

Initials of Service Provider's Authority: .....

7. Tests & Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Type-tested to IEC / SANS 60282 for:
  - Breaking capacity
  - Power dissipation and temperature rise
  - Time-current characteristics
  - Mechanical and climatic endurance
- Routine-tested for dimensions, resistance and visual inspection at factory
- Certified test certificates shall accompany every delivery batch

8. Packaging & Delivery

- Fuse links supplied in sealed, moisture-proof cartons, each carton labelled with:
  - Fuse type (current-limiting / expulsion)
  - Rated voltage and current
  - Manufacturer and batch number
- Drop-out assemblies and hardware to be boxed or crated, with all small components bagged and tagged

9. Documentation & Warranty

- Supplier to provide type-test and routine-test certificates, conformity declarations and recommended installation / replacement instructions
- Warranty: 12 months from installation or 18 months from delivery, whichever occurs first
- Defective items to be replaced at supplier's cost

Initials of Service Provider's Authority: .....

ITEM 23: SPECIFICATIONS FOR LOW-VOLTAGE (LV) FUSES

1. Scope
Supply and deliver low-voltage fuse links and fuse carriers for use in the Municipality's 230/400 V distribution network, including kiosks, feeder pillars, mini-substations and LV switchboards.

2. Applicable Standards
- IEC / SANS 60269-1 – Low-voltage fuses – General requirements
- IEC / SANS 60269-2 – Low-voltage fuses for industrial applications
- IEC / SANS 60269-3 – Low-voltage fuses for use by unskilled persons (gG / gL types)
- SANS 1411-1 – Marking of electrical equipment
- ISO 9001 / 14001 – Quality and environmental management

3. Service Conditions
- Rated for 230/400 V AC, 50 Hz
- Installed in indoor or outdoor kiosks, feeder pillars and switchboards
- Suitable for coastal, high-humidity and polluted environments
- Operating temperature: –10 °C to +45 °C
- Designed to withstand short-circuit levels ≥ 80 kA at 400 V AC

4. LV Fuse Links
- Type: HRC (High-Rupturing Capacity) fuse links, blade-type or J-type as required
- Voltage rating: 500 V AC minimum
- Rated breaking capacity: ≥ 80 kA at 400 V AC
- Rated currents: as per BOQ (e.g. 32 A, 63 A, 80 A, 100 A, 125 A, 160 A, 200 A, 250 A, 315 A, 400 A)
- Characteristics: gG / gL for general-purpose cable and equipment protection, or aM for motor circuits where specified
- Each fuse link shall be clearly and permanently marked with manufacturer, rated current, rated voltage and breaking capacity

5. Fuse Carriers / Bases
- Material: moulded, flame-retardant and UV-stabilised polymer suitable for outdoor kiosks and feeder pillars
- Design: shrouded live parts, finger-safe, with good mechanical strength
- Shall accept the relevant blade-type or J-type fuse links
- Terminals shall be suitable for both copper and aluminium conductors as specified
- Shall comply with IEC / SANS 60269-2 / 3

6. Accessories
- Supply spare fuse links – at least 5 % of each rating specified
- Provide appropriate carriers and mounting bases for each fuse size
- Supply installation and safety instructions

7. Tests & Quality Assurance
- Manufacturer shall be ISO 9001-certified
- Fuses shall be type-tested in accordance with IEC / SANS 60269 for:
  – Breaking capacity

Initials of Service Provider's Authority: .....

  - Time-current characteristics
  - Power loss and temperature rise
- Each production batch shall be routine-tested for dimensions, resistance and visual quality
- Certified test certificates shall accompany every delivery batch

8. Packaging & Delivery

- Fuse links to be supplied in sealed, moisture-proof cartons marked with:
  - Fuse type (blade or J-type)
  - Rated current and voltage
  - Manufacturer and batch number
- Carriers and bases to be boxed and protected against moisture and mechanical damage
- All small parts to be bagged and tagged by size and rating

9. Documentation & Warranty

- Supplier to provide conformity certificates, type-test and routine-test reports, and installation guidelines
- Warranty: 12 months from installation or 18 months from delivery, whichever occurs first
- Defective items shall be replaced at the supplier's cost

Initials of Service Provider's Authority: .....

ITEM 24: SPECIFICATIONS FOR POLES

1. Scope

Supply and deliver distribution line poles for 11 kV and LV overhead networks, including:

- Wooden eucalyptus poles
- Galvanised steel poles
- Fibreglass

All poles shall be suitable for rural and urban installations and for both inland and coastal environments.

2. Applicable Standards

- SANS 754 – Wooden poles for power distribution
- SANS 457-2 – Timber for transmission poles
- SANS 10199 – Creosote treatment of timber
- SANS 10322 – Hot-dip galvanising of steel poles
- SANS 10280 – Fibre-reinforced polymer composite poles
- Manufacturer shall be ISO 9001 certified

3. Service Conditions

- Nominal system voltage: up to 11 kV
- Designed for medium to heavy line-loading regions per SANS
- Suitable for coastal, high-humidity, high-pollution conditions
- Expected service life:
    - Wooden poles: ≥30 years
    - Steel and composite poles: ≥40 years

4. Technical Requirements

4.1 Wooden Eucalyptus Poles

- Eucalyptus poles treated with creosote or CCA preservative to SANS 457-2 and SANS 10199
- Supplied with treatment certificate and clearly date-stamped
- Standard sizes:
    - 9 m – LV lines and streetlighting
    - 10 m – Light MV distribution
    - 11 m – Standard MV distribution
    - 14 m – Strain and heavy MV line positions
- Minimum top diameters:
    - 9 m – ≥140 mm
    - 10 m – ≥150 mm
    - 11 m – ≥160 mm
    - 14 m – ≥180 mm

4.2 Galvanised Steel Poles

- Fabricated from rolled or tubular steel
- Hot-dip galvanised inside and outside per SANS 10322
- Minimum wall thickness:
    - ≥4 mm for 9–11 m poles

Initials of Service Provider's Authority: .....

- ≥5 mm for 12–14 m poles
- Fitted with welded base plate and earthing provision
- Designed for equivalent load performance to wooden poles of the same length class

4.3 Fibreglass / Composite Poles

- UV-stabilised, resin-impregnated fibreglass per SANS 10280
- Flame-retardant, self-extinguishing
- Resistant to rot, corrosion, termite attack, and conductive pollution
- Available in the same lengths as wooden poles (9 m, 10 m, 11 m, 14 m)
- Designed as drop-in replacement for existing wooden poles

5. Tests and Quality Assurance

- Type-tested for mechanical loading per SANS
- Batch-tested for:
  - Creosote retention and penetration (wooden poles)
  - Galvanising thickness and adhesion (steel poles)
  - Tensile and bending strength (composite poles)
- Test certificates to be supplied with every batch

6. Packaging and Delivery

- Poles to be supplied in bundles with protective spacers
- Each pole to be clearly marked with:
  - Manufacturer's name
  - Length
  - Class
  - Date of treatment/manufacture

7. Documentation and Warranty

- Warranty:
  - Wooden poles: 10 years against decay and insect attack
  - Steel and composite poles: 15 years against corrosion or structural failure
- Full compliance certificates and test reports to be provided

Initials of Service Provider's Authority: .....

ITEM 25: SPECIFICATIONS FOR STREET AND AREA LIGHTING

1. Scope
Supply and deliver streetlight fittings, area floodlights, post-top luminaires, LED lamps, daylight switches, brackets, clamps, and associated mounting hardware for use on municipal MV/LV streetlighting networks.

2. Applicable Standards
- SANS 60598 – Luminaires (general requirements)
- SANS 475 – Road-lighting luminaires
- SANS 213 – Lamp holders and control gear
- IEC 62471 – LED photobiological safety
- SANS 121 – Hot-dip galvanising of steelwork
- ISO 9001 / ISO 14001 – Quality & environmental management

3. Service Conditions
- Suitable for outdoor service in coastal and high-humidity environments
- Designed for operation on 230 V AC, 50 Hz (unless otherwise specified)
- Ingress protection: minimum IP65 for optical and control compartments
- Brackets and clamps: hot-dip galvanised after fabrication
- Expected luminaire service life: > 50 000 h (LED, L70 at 25 °C ambient)

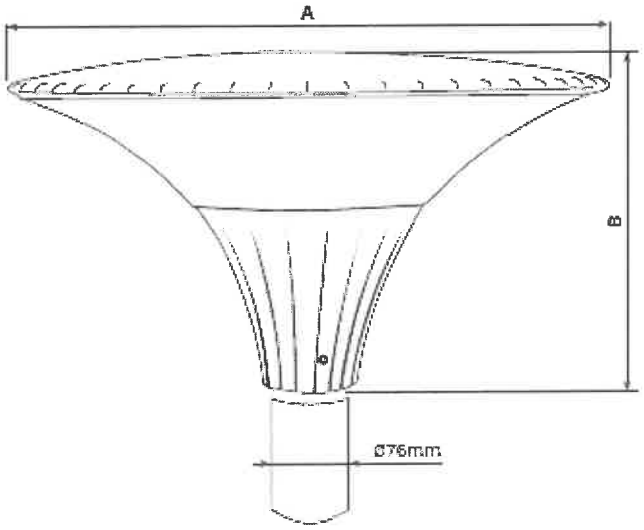
4. Requirements
4.1 LED Streetlight Luminaires
- Back- and bottom-entry types:
  - 20 W, 36 W, 44 W, 50 W LED luminaires
- Complete units with:
  - Integrated LED driver and surge protection
  - Die-cast aluminium housing, powder-coated, corrosion-resistant
  - Optics designed for Type II / III road-lighting distribution
  - Luminous efficacy: ≥ 120 lm/W
  - Colour temperature: 4000–5000 K (Cool White)
  - Power factor: > 0.95, THD < 10 %
  - Lifetime: > 50 000 h at L70
  - Mounting: 42–60 mm spigot for outreach brackets
  - Enclosure protection: IP65, impact resistance IK08

4.2 LED Floodlights (Area Lighting)
- Ratings: 50 W, 100 W, 200 W, 250 W, 400 W, 455 W
- Die-cast aluminium body with tempered-glass cover
- Corrosion-resistant, IP66 for outdoor use
- Surge protection: ≥ 10 kV
- Power factor: > 0.95, THD < 10 %
- Suitable for pole or wall mounting

Initials of Service Provider's Authority: .....

4.3 Post-Top LED Luminaires *(ZELA-type)*

- Ratings: 20-22 W and 36 -38 W
- Intended for residential streets, pathways, parks, and pedestrian areas
- Mechanical:
  - Marine-grade die-cast aluminium base and gear tray
  - ASA or coated aluminium top cover
  - High-impact acrylic protector (IK08) or optional polycarbonate (IK10)
  - IP66 optical/control compartment
  - Standard finish: light grey RAL 7047 (other RAL colours optional)
  - Weight approx. 4.9 kg
  - Mounting: bottom-entry Ø76 mm spigot, ≥80 mm insertion depth
- Optical:
  - Symmetrical or asymmetrical light distribution options
  - LED colour temperature: 4000 K Neutral White (std) or 5700 K Cool White (optional)
  - CRI ≥ 70, ULOR ≤ 8 %
  - Faceted reflector for improved road- or path-lighting (asymmetrical)
- Electrical:
  - Nominal supply 198–264 V AC, 50 Hz
  - Power factor > 0.95, surge protection ≥ 10 kV/10 kA
  - Lifetime: LEDs 100 000 h L70B10 at 25 °C, driver 80 000 h
- Performance:
  - Luminaire efficacy ≥ 120 lm/W
  - Typical wattages 22–46 W to replace HID 70–100 W post-tops
  - Low-glare indirect optical system suitable for residential and pedestrian zones
- Optional integrated photocell, dimming interface (1–10 V / DALI) or solar version



Initials of Service Provider's Authority: .....

4.4 LED Lamps and Tubes

- LED Bulbs: 6 W, 9 W, 12 W, 18 W (ES and BC caps as specified)
- LED Tubes: 36 W (1.2 m and 1.5 m) Cool White
- Other lamp types:
  - LED 13 W BC/ES Cool White
  - LED 16 W × 2D
  - LED 20 W and 30 W E27 Cool White
- All lamps:
  - Luminous efficacy ≥ 100 lm/W
  - Colour temperature 4000–5000 K
  - Rated life > 25 000 h

4.5 Solar LED Streetlight

- 100 W integrated solar streetlight
- Includes monocrystalline solar panel, $LiFePO_4$ battery, charge controller and LED luminaire
- IP65 weatherproof housing
- Provides ≥ 12 h nightly operation with ≥ 3 days battery autonomy
- Suitable for pole or wall mounting

4.6 Daylight Switches / Photocells

- Outdoor daylight sensors for automatic switching
- Types:
  - DLS LS16 230 V domed
  - Compact 20 mm DLS sensor
- Operating voltage: 230 V AC, 50 Hz
- Switching capacity: ≥ 10 A resistive load
- Switch-on at ≤ 30 lux, switch-off at ≥ 80 lux
- IP65 outdoor rating, UV-resistant housing
- Ambient temperature: –10 °C to +50 °C
- ≥ 50 000 operations design life
- 3-wire connection (L in / L out / N)
- Mounting:
  - Domed type for external pole/wall
  - Compact 20 mm type for pole-top or luminaire base

4.7 Brackets and Mounting Hardware

- Galvanised steel streetlight brackets:
  - Outreach lengths: 300 mm, 500 mm, 1 000 mm
  - Hot-dip galvanised to SANS 121
  - Spigot size: 42–60 mm
- Brackets supplied with galvanised clamps for pole mounting
- Clamps & fittings:
  - Aluminium/aluminium 2-bolt
  - PG clamps, wedge clamps, Crosby clamps (No. 10, 12, 16, 20)
  - Clips and earth-spike clamps for pole earthing

5. Tests & Quality Assurance

- Luminaires comply with SANS 60598 for type-tests (photometry, IP, electrical safety)
- Surge protection devices tested to IEC 61643
- Brackets & clamps galvanised to SANS 121
- Compliance certificates to accompany each delivery batch

6. Packaging & Delivery

- Luminaires & lamps packed in manufacturer's original cartons with type, wattage, batch clearly marked
- Brackets, clamps & daylight switches bundled and protected against corrosion and mechanical damage

7. Documentation & Warranty

- All LED luminaires: minimum 5-year warranty
- Solar streetlights: minimum 3-year battery warranty
- Daylight switches: minimum 3-year warranty
- Supplier to provide installation and maintenance guidelines

Initials of Service Provider's Authority: .....

ITEM 26: SPECIFICATIONS FOR ELECTRICITY METERS (BULK)

1. Scope

Supply and deliver bulk three-phase smart revenue meters for municipal use, including:

- Whole-current meters for direct connection up to 100 A
- CT-operated meters for high-load bulk points
- Communication modems and outdoor antennas for remote data acquisition
- Test blocks for CT installations

All meters must be suitable for integration with the municipality's existing AMI / load profile systems.

2. Standards

- IEC / SANS 62052-11 – General requirements for electricity metering
- IEC / SANS 62053-22 – Static meters for active energy, Class 0.5S or better
- IEC / SANS 62053-23 – Reactive energy, Class 2
- IEC 62056 / DLMS-COSEM – Data communication protocol
- IEC 61000-4-5 – Surge immunity
- IEC 62059 – Reliability and performance evaluation
- SANS 470 – Safety of electricity meters
- ICASA compliance for modem
- ISO 9001 for manufacturer

3. Service Conditions

- Voltage: 3-phase, 4-wire, 3×230/400 V, 50 Hz
- Ambient: –10 °C to +55 °C, humidity ≤ 95 % RH, non-condensing
- Suitable for coastal outdoor kiosks (IP54 or better)
- Minimum life expectancy: >15 years

4. Meter Features (Common to All)

- Measurement: Active and reactive energy in all quadrants, apparent power, demand, voltages, currents, PF, frequency, harmonics (≥ 15th)
- Accuracy: Active – Class 0.5S or 0.2S; Reactive – Class 2
- Load Profile: ≥ 90 days @ 15-min interval with programmable integration period
- Tariffs: ≥ 4 tariffs, ≥ 8 time-zones, ≥ 12 seasons, ≥ 24 holidays
- Demand & TOU: 5, 15 or 30-min demand calculation; programmable TOU schedules
- Event Logs: Power failures, cover opening, reverse current, tampers, voltage dips/swells, phase failures
- Communication: Optical port (IEC 62056-21) and galvanically-isolated RS-485 or RJ-45 port; DLMS/COSEM compliant
- Display: Back-lit LCD showing kWh, kvarh, kVAh, voltages, currents, PF, demand, comms status
- Power Supply: Self-powered from measuring circuit
- RTC: Drift ≤ 1 min/year, supports remote synchronisation
- Insulation: Withstands 4 kV, 50 Hz, 1 min
- Protection: IP54 minimum, UV-resistant polycarbonate housing with terminal and cover seals
- Firmware: Upgradeable locally or remotely
- Data Retention: ≥ 12 months without power

Initials of Service Provider's Authority: .....

5. Whole-Current Meters

- Direct-connected type for loads up to 3×100 A
- Otherwise identical to general meter requirements above

6. CT-Operated Meters

- For use with external CTs, programmable for 1 A or 5 A secondary
- All other functions identical to above
- To be supplied complete with a 3-phase, 4-wire, 8-pole test block

7. Modem

- GPRS / LTE / NB-IoT compatible, DLMS/COSEM compliant
- Wide-range AC supply 85-265 V
- Automatic reconnect and fallback (2G/3G/4G)
- DIN-rail mounting
- LED indicators for power, network, and comms
- Supplied with 2 m RS-485 cable

8. Antenna

- Outdoor, weather-resistant, high-gain ≥ 6 dBi
- Covers GPRS/LTE/NB-IoT frequencies
- Pole or wall mount with bracket
- ≥ 2.5 m coaxial cable with SMA connector
- Lightning protection integral or supplied separately

9. Test Block (for CT Meters)

- 3-phase, 4-wire, 8-pole short-circuiting type
- Brass contacts, nickel-plated
- Transparent insulated cover with sealable screws
- Rated ≥ 20 A continuous per pole
- Supplied with mounting brackets and end-caps

10. Documentation & Warranty

- Manufacturer's type-test certificates
- Installation, commissioning, and operating manuals

Initials of Service Provider's Authority: .....

ITEM 27: SPECIFICATIONS FOR ELECTRICITY METERS SINGLE PHASE

1. Scope

Supply and deliver single-phase electronic energy meters for residential and small commercial customers:

- Direct-connected electronic meters (up to 60 A) for conventional loads
- Bi-directional electronic meters for customers with embedded generation (e.g. rooftop PV)
- Associated communication modems and outdoor antennas for remote meter reading

2. Applicable Standards

- IEC / SANS 62052-11 – General requirements for static meters
- IEC / SANS 62053-21 / 23 – Active and reactive energy measurement
- IEC / SANS 62053-24 – Static meters for load control
- IEC 62056 / DLMS-COSEM – Data exchange
- IEC 60529 – IP degree of protection
- SANS 470 – Electrical safety
- ICASA – Cellular modem approval
- ISO 9001 – Quality management for manufacturer

3. Service Conditions

- Voltage: 1-phase, 2-wire, 230 V AC, 50 Hz
- Current rating: up to 60 A continuous
- Ambient: –10 °C to +55 °C, RH ≤ 95 % non-condensing
- Installation: Outdoor or indoor meter box, IP54 or higher
- Accuracy: Class 1 or Class 0.5 S active energy
- Sealed terminal covers for tamper resistance

4. Functional Requirements – All Single-Phase Meters

- Digital LCD display, back-lit, with parameter scrolling
- Measures active (kWh) and reactive (kvarh) energy
- Event logging: tamper, reverse current, cover open, phase fail, loss of voltage
- Load profile: ≥ 60 days @ 15-min intervals
- Internal real-time clock: drift ≤ 1 min/year, battery-backed ≥ 10 years
- Data retention ≥ 12 months without power
- Optical port to IEC 62056-21 plus RS-485 or equivalent port
- Firmware upgradeable locally or remotely
- Tamper-proof terminal covers and metrology seals

5. Bi-Directional SSEG Meter (for Rooftop PV / Net-Metering)

- All functional requirements above plus:
- Four-quadrant measurement – separate import and export energy
- Accuracy: Class 1 or 0.5 S for import & export
- Event logging: reverse flow, voltage dips, cover open, tamper events
- DLMS/COSEM compliant for municipal AMI
- Capable of demand & load-profile logging for both import and export

Initials of Service Provider's Authority: .....

6. Modems for Single-Phase Meters

- Technology: LTE Cat-M1 / NB-IoT with fallback to 2G
- DLMS/COSEM over TCP/IP or RS-485
- DIN-rail or base-mounted in meter enclosure
- Auto-reconnect after power/network loss
- Remote APN configuration via secure web/SMS
- Power supply: 85–265 V AC, 50 Hz
- LED indicators for power, network, and data traffic
- Operating range: –20 °C to +60 °C, RH ≤ 95 %
- Secure communication with TLS/SSL encryption

7. Antennas for Single-Phase Modems

- Outdoor omnidirectional antenna for LTE/NB-IoT bands (698–2700 MHz)
- Gain ≥ 6 dBi
- IP65 or better, UV-resistant housing
- Pole- or wall-mount bracket supplied
- ≥ 2.5 m low-loss coaxial cable with SMA-M connector
- Integrated lightning protection or supplied in-line

8. Documentation & Warranty

- Type-test certificates for meters, modems, and antennas from accredited labs
- Installation, commissioning, and operating manuals

Initials of Service Provider's Authority: .....

ITEM 28: SPECIFICATIONS FOR CURRENT TRANSFORMERS (CTS)

1. Scope

Supply and deliver moulded insulated current transformers for revenue metering applications in the municipal LV and MV network:

- For use with bulk CT-operated three-phase electronic meters
- Suitable for indoor and outdoor installations (depending on type)
- Available in all ratios specified in the BOQ

2. Applicable Standards

- IEC / SANS 61869-1 – General requirements for instrument transformers
- IEC / SANS 61869-2 – Current transformers
- IEC 60044-1 (where referenced by local SANS)
- IEC 60529 – IP degrees of protection
- ISO 9001 – Quality management for manufacturer

3. Service Conditions

- System voltages: 11 kV and 400 V networks
- Frequency: 50 Hz
- Ambient temperature: –10 °C to +55 °C
- Relative humidity: up to 95 %, non-condensing
- Altitude: up to 2000 m above sea level
- Outdoor types: UV-stabilised moulded housing, minimum IP54
- Indoor types: minimum IP40

4. Technical Requirements

- Accuracy class:
  - Class 0.2 S or 0.5 S for revenue metering
  - Class 1 may be used for general monitoring or non-billing applications
- Burden:
  - ≤ 10 VA for Class 0.2 S or 0.5 S
  - As specified in BOQ for each size
- Rated continuous current: as specified (e.g. 100 A, 150 A, 200 A, 300 A, 400 A, 600 A, 800 A, 1000 A, 1200 A, 1500 A, 2000 A)
- Short-time thermal current (Ith): ≥ 40 × rated current for 1 second
- Dynamic current: ≥ 2.5 × Ith
- Insulation level:
  - For LV CTs: 0.72/3/20 kV
  - For MV CTs (11 kV): 12/28/75 kV
- Secondary current: 5 A standard (1 A where specified)
- Core type: metering core, low remanence, with terminal shorting link
- Markings: ratio, accuracy class, burden, rated current, serial number, manufacturer
- Terminals: brass or tinned copper with captive screws, capable of accepting 2.5–16 mm² conductors
- Mounting:
  - Bar primary or window/through type for busbar or cable

Initials of Service Provider's Authority: .....

- Outdoor types provided with stainless-steel mounting brackets

5. Tests & Quality Assurance

- Type-tested to IEC / SANS 61869-2 for accuracy, thermal and dynamic performance, insulation, partial discharge
- Routine-tested for ratio, polarity, insulation and terminal tightness
- Certified test reports to be supplied with each batch
- Manufacturer must be ISO 9001 certified

6. Documentation & Warranty

- Manufacturer's type-test certificates
- Routine-test reports per batch
- Installation and maintenance instructions
- Warranty: minimum 5 years

Initials of Service Provider's Authority: .....

ITEM 29: SPECIFICATIONS FOR READY BOARDS

1. Scope

Supply and deliver factory-assembled ready boards for domestic electrical connections.
Boards shall be complete with all protective devices, accessories, internal wiring, and one bulkhead light fitting, ready for installation.

2. Applicable Standards

- SANS 10142-1 – Wiring of Premises
- SANS 60947-3 – Switch-disconnectors
- SANS 60898 – Miniature Circuit Breakers (MCBs)
- SANS 61008 – Residual Current Devices (Earth Leakage)
- SANS 60529 – IP rating
- ISO 9001 – Quality management for manufacturer

3. Service Conditions

- Rated for 230 V AC, 50 Hz
- Indoor installation, minimum IP40 enclosure
- Ambient temperature: –5 °C to +45 °C
- Relative humidity up to 95 %

4. Technical Requirements

- Enclosure:
  - Compact, impact-resistant, UV-stabilised thermoplastic (or epoxy-coated steel)
  - Surface-mount type with removable cover and lockable door
  - Minimum IP40, with internal busbar system and protective shrouds
- Main switch:
  - 30 A double-pole switch-disconnector, SANS 60947-3 compliant
- Earth leakage unit:
  - 63 A double-pole residual current device (RCD)
  - Rated residual operating current 30 mA
- Circuit breakers:
  - 1 × 20 A MCB (lighting circuit)
  - 1 × 10 A MCB (socket-outlet / plug circuit)
  - MCBs to SANS 60898, 6 kA minimum breaking capacity
- Light fitting:
  - 1 × Bulkhead fitting, IP54 minimum, with LED or energy-efficient lamp
- Socket-outlets:
  - 1 × 2×4 single plug
  - 1 × 4×4 double plug
  - SANS-compliant, mounted on faceplate
- Wiring:
  - Pre-wired internally using SANS-approved copper conductors
  - Wiring neatly bunched, colour-coded and labelled
- Markings:

Initials of Service Provider's Authority: .....

- Each device labelled (Main Switch, Earth Leakage, Lighting MCB, Plug MCB, etc.)
- Manufacturer's name, serial number and rating plate on the enclosure

5. Tests & QA

- Type-tested to SANS 60947, SANS 60898, SANS 61008
- Routine-tested for insulation, earth continuity, polarity and functional checks
- Manufacturer shall be ISO 9001 certified
- Test certificates to accompany each batch

6. Documentation & Warranty

- Manufacturer's data sheet and wiring diagram supplied with each unit
- Warranty: minimum 24 months

Initials of Service Provider's Authority: .....

ITEM 30: SPECIFICATIONS FOR ENCLOSURES & BOXES

1. Scope

Supply and deliver various junction boxes, meter boxes, pole/wall-mounted boxes, Pratley and Wonder boxes, York boxes, PVC boxes, and lids for use in LV distribution networks and installations.

All boxes shall be suitable for indoor or outdoor use as specified and comply with all relevant SANS standards.

2. Applicable Standards

- SANS 60529 – Degrees of protection (IP rating)
- SANS 60670 / IEC 60670 – Boxes and enclosures for electrical accessories
- SANS 1973 – Distribution boxes
- SANS 121 – Hot-dip galvanising for steel components
- ISO 9001 – Quality management

3. Service Conditions

- Rated operational voltage: 230/400 V AC, 50 Hz
- Ambient temperature: –5 °C to +45 °C
- Relative humidity: up to 95 %
- Outdoor enclosures: IP54 minimum (UV-stabilised, weatherproof)
- Indoor enclosures: IP20 minimum unless otherwise specified
- All plastic materials: flame-retardant, self-extinguishing

4. Requirements

4.1 Pratley & Wonder Boxes

- 3-Way Pratley Box (No.1, 2, 3, 4) – Heavy-duty PVC junction boxes for LV cable terminations
- 4-Way Box – Heavy-duty PVC junction box
- 4×2 Wonder Box & 4×4 Wonder Box – Standard surface or flush-mount boxes for switches and outlets
- 6-Way Box – Heavy-duty PVC junction box for larger terminations

4.2 Round & Flush Boxes

- 3-Way Round Boxes (20 mm & 25 mm) – For conduit terminations
- Flush Boxes (4×2 and 4×4) – For in-wall mounting of switches, sockets, and accessories
- PVC material, flame-retardant, with secure knock-outs and smooth finish

4.3 PVC Lax Boxes

- LAX 16 & LAX 170 – Heavy-duty PVC junction boxes for general distribution use
- UV-resistant, suitable for outdoor mounting
- Supplied with lids and gaskets

4.4 York Boxes & Lids

- York J2 & J3 Boxes – Standard PVC junction boxes for outdoor or indoor installations
- Box Lids (Standard & Oversize) – Compatible with York boxes, fitted with stainless-steel screws and weatherproof gaskets

Initials of Service Provider's Authority: .....

4.5 Pole / Wall Mounted & Meter Boxes

- Plastic Pole-Mounting Box (SPB1) – UV-resistant, outdoor-rated, lockable box for small service connections
- Pole/Wall Polyethylene Box 605 × 450 mm – Weatherproof, UV-stabilised, suitable for pole or wall mounting
- Meter Boxes:
    - Single-phase: Lockable, UV-resistant, suitable for outdoor wall or pole mounting
    - Lock Meter Box: Heavy-duty enclosure for secure installation of single- or three-phase meters

5. Tests & Quality Assurance

- Type-tested for mechanical strength, flame resistance, and IP rating per relevant SANS standards
- Routine-tested for dimensional accuracy and material consistency
- Test certificates to be supplied with each batch

6. Documentation & Warranty

- Manufacturer's datasheets and installation guidelines provided for each type of box

Initials of Service Provider's Authority: .....

ITEM 31: SPECIFICATIONS FOR ELECTRICAL CONSUMABLES – LUGS & FERRULES

1. Scope
Supply and deliver a full range of lugs and ferrules for use on LV and MV conductors in the municipal distribution network, including copper, aluminium, bi-metallic, triangular, round and solid-centre types.

2. Applicable Standards
- IEC / SANS 61238-1 – Compression and mechanical connectors for power cables
- SANS 121 – Hot-dip galvanising for any steel components
- SANS 10142-1 – Wiring of premises
- DIN 46228 – Boot-lace ferrules, colour-coded sizes
- ISO 9001 – Quality management system

3. Service Conditions
- Voltage: suitable for 230/400 V LV and 11 kV MV systems
- Conductor types: Copper, Aluminium, AAAC, ACSR
- Ambient temperature: –10 °C to +90 °C
- Outdoor use: corrosion-resistant and UV-stable
- All compression types to be crimped with hex-type crimping tools as per manufacturer's instructions

4. Requirements
4.1 Compression Lugs
- High-conductivity copper lugs, tinned finish for corrosion resistance
- Aluminium compression lugs for aluminium conductors
- Bi-metallic lugs (Al barrel / Cu palm) for aluminium conductor to copper busbar terminations
- Available in round and triangular palm designs
- Chamfered entry for easy conductor insertion
- Size range: 1.5 mm² to 500 mm² with stud holes from 5 mm to 20 mm as required
- For MV cable terminations: to comply with SANS 61238-1 and compatible with heat-shrink joints

4.2 Soldering Lugs
- Copper lugs for special applications
- Sizes: 60 A, 100 A, 200 A

4.3 Ferrules
- Standard ferrules: tinned copper, for general crimping applications
- Solid-centre ferrules: for larger cross-sections (16 mm² – 185 mm²)
- Aluminium ferrules: for aluminium conductors, available in round or triangular types
- Boot-lace ferrules: insulated, colour-coded to DIN 46228 for panel wiring (0.5 mm² – 50 mm²)
- Bundle ferrules: available in standard colours (grey, black, white, pink, yellow, orange) for cable harnesses
- Size range: 1.5 mm² to 500 mm²

Initials of Service Provider's Authority: .....

5. Tests & Quality Assurance

- Type-tested to IEC / SANS 61238-1 for:
  - Electrical resistance
  - Mechanical pull-out strength
  - Thermal cycling endurance
- Manufacturer to be ISO 9001 certified
- Test certificates for each batch to be provided on request

6. Packaging & Delivery

- Supplied in sealed, clearly labelled packets by type and size
- Labels to indicate manufacturer, size, material and batch number

7. Documentation & Warranty

- Manufacturer's datasheets and crimping instructions to be supplied

Initials of Service Provider's Authority: .....

ITEM 32: SPECIFICATIONS FOR ELECTRICAL CONSUMABLES – TAPES & SAFETY MARKING

1. Scope
Supply and deliver electrical insulation, jointing, protective and safety marking tapes for use in LV and MV cable work, jointing, corrosion protection, and site marking.

2. Applicable Standards
- IEC 60454 / SANS 122 – Adhesive insulating tapes for electrical use
- IEC 62241 / SANS 121 – Corrosion-protective wrapping materials (bitumen / impregnated)
- SANS 1418 – Marking and identification of underground services
- ISO 9001 – Quality management

3. Service Conditions
- Electrical use: suitable for 230/400 V LV and up to 11 kV MV cables and joints
- Safety / site marking: suitable for indoor/outdoor use in construction and trenching
- Temperature range: –10 °C to +90 °C for electrical tapes
- Weatherproof and UV-stable for outdoor barrier and warning tapes

4. Requirements
4.1 Electrical Insulating Tapes
- PVC Insulation Tapes (3M or equivalent)
  - Flame-retardant, high adhesion
  - Width: 19 mm; Thickness: 0.18 mm min.
  - Colours for phase identification: Red, Yellow, Blue, Black, Green/Yellow (earth), White
  - Dielectric strength: ≥40 kV/mm
- HT Grey Tape
  - High-temperature heavy-duty PVC tape for LV/MV joints
  - Service temperature up to 90 °C continuous
- Self-Amalgamating Rubber Tape (e.g., Scotch 23, Pratley Rubber)
  - Non-adhesive, self-fusing for MV cable jointing and sealing
  - Moisture-proof, UV-stable
  - Service temperature –40 °C to +90 °C
- Impregnated Tape
  - Protective moisture-resistant tape for cable terminations and repairs
  - Compatible with other insulation layers
- Bitumen Tape
  - Corrosion-protective, moisture-resistant wrapping tape for underground cable joints and terminations
  - Conforms to SANS 121
- PTFE Thread Tape
  - For sealing threaded connections on glands and accessories
  - Width: 12.7 mm standard

4.2 Safety & Barrier Tapes
- Red & White Barrier Tape
  - Heavy-duty polyethylene for general site barricading

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  - Width: 75–100 mm, thickness ≥100 µm
- Black & Yellow Danger Tape
  - For general hazard marking on site
  - Width: 75–100 mm, thickness ≥100 µm
- Hazard / Warning Tape
  - Similar black & yellow or red & white, UV-stable, for indoor/outdoor use
- Scull & Crossbone Tape
  - Black-on-yellow or red-on-white
  - Sizes: 150 mm and 300 mm width
  - For demarcation of hazardous or live work areas
- Shark Netting / Barrier Fencing
  - Safety mesh fencing for site barricading around open trenches or cable routes
  - Size: typically 1 m × 50 m roll
  - Bright orange, UV-stable

5. Packaging & Delivery

- Supplied in standard rolls (e.g., 10 m, 20 m, 33 m, or 50 m as applicable)
- Barrier fencing supplied in 1 m × 50 m rolls
- All rolls to be individually wrapped and clearly labelled with:
  - Product type
  - Size / length
  - Batch number
  - Manufacturer

6. Tests & Quality Assurance

- Electrical tapes: tested to IEC 60454 for adhesion, tensile and dielectric strength
- Barrier / warning tapes: tested for UV stability and tensile strength
- Manufacturer must be ISO 9001 certified
- Test certificates to be provided on request

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ITEM 33: SPECIFICATIONS FOR ELECTRICAL CONSUMABLES - FUSES

1. Scope

Supply and deliver fuses for use in the municipal 11 kV and 230/400 V distribution network, including:

- MV drop-out and striker-pin type fuses for overhead lines and transformer/RMU protection
- LV HRC cartridge fuses for feeder pillars, kiosks and DBs
- Flying/service fuses for pole-mounted streetlight and service connections

All fuses are intended as consumables and must be interchangeable with standard municipal equipment.

2. Applicable Standards

- IEC 60282-1 / SANS 60282-1 – High-voltage fuses for alternating current
- IEC 60269 / SANS 60269 – Low-voltage fuses
- SANS 556 / SANS 171 – HRC fuses for LV distribution
- SANS 486 / SANS 137 – Drop-out fuse-cut-outs
- All products shall be type-tested and certified by accredited laboratories.

3. Service Conditions

- Nominal system voltages: 230/400 V (LV) and 11 kV (MV)
- Rated frequency: 50 Hz
- MV fuses for outdoor service shall be weatherproof, UV-resistant and suitable for coastal and high-humidity conditions
- LV fuses shall be suitable for use in indoor kiosks, feeder pillars and distribution boards.

4. Technical Requirements

4.1 Medium-Voltage (MV) Fuses

- Rated voltage: 11 kV (Um = 12 kV)
- Type: Drop-out or striker-pin fuse-links for use in outdoor cut-outs and RMUs
- Typical current ratings: 8 A, 10 A, 15 A, 20 A, 25 A, 31.5 A, 40 A, 50 A, 63 A, 80 A, 90 A
- Time–current characteristics equivalent to Type K or better
- Arc-quenching medium: non-hygroscopic silica sand or equivalent
- Fully compatible with standard 11 kV drop-out carriers installed in the network.

4.2 Low-Voltage (LV) HRC Fuses

- Rated voltages: 230/400 V AC
- Rated breaking capacity: ≥ 80 kA
- Cartridge-type HRC fuses (ferrule or blade) for use in LV feeder pillars, kiosks, meter boards and streetlight circuits
- Typical current ratings: 6 A, 10 A, 16 A, 20 A, 25 A, 35 A, 50 A, 63 A, 80 A, 100 A, 125 A, 160 A, 200 A, 250 A, 315 A
- Compatible with commonly used municipal fuse-bases (e.g. Bussmann, SIBA, Mersen).

4.3 Flying / Service Fuses

- For use on pole-mounted service connections and streetlight supplies
- Typical current ratings: 5 A, 10 A, 15 A, 30 A
- Weatherproof design with wing-nut terminals for ease of installation and replacement.

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5. Tests and Quality Assurance

- Manufacturer shall be ISO 9001-certified
- Fuses shall be type-tested to relevant IEC/SANS standards for:
    - Rated current and breaking capacity
    - Time–current characteristics
    - Temperature rise
    - Dielectric and mechanical strength
- Routine-tested for compliance before delivery
- Type-test and routine-test certificates to accompany each batch.

6. Packaging and Delivery

- Fuses to be packed in protective cartons, clearly labelled with:
    - Manufacturer's name
    - Model/type
    - Rated voltage and current
    - Batch number and manufacturing date
- Packaging to ensure protection from moisture and mechanical damage during transport and storage.

7. Documentation and Warranty

- Supplier to provide certificates of compliance and test reports with each consignment
- Installation and safety instructions to be supplied
- Warranty: 12 months from installation or 18 months from delivery, whichever occurs first.

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ITEM 34: SPECIFICATIONS FOR CABLE GLANDS & SHROUDS

1. Scope
Supply and deliver a range of cable glands and shrouds suitable for terminating LV and MV XLPE/PVC insulated, armoured and unarmoured cables in kiosks, feeder pillars, switchgear and streetlighting equipment.

Glands must be supplied complete with locknuts, washers, earth tags (for armoured cables) and appropriate weather-resistant shrouds.

2. Applicable Standards
- SANS 121 / ISO 1461 – Hot-dip galvanising of steel parts
- SANS 314 / IEC 62444 – Cable glands for electrical installations
- SANS 1411-1 – Marking of electrical equipment
- IEC 60529 – Degrees of protection (IP ratings)
- IEC 61238-1 – Cable connectors for power cables
- Manufacturer to be ISO 9001 certified.

3. Service Conditions
- Voltage rating: up to 11 kV
- For indoor and outdoor use in kiosks, feeder pillars and switchgear
- Operating temperature: –20 °C to +90 °C
- Resistant to UV, moisture, oils, mild chemicals and coastal corrosion
- Glands for armoured cables to provide continuous metallic earth continuity.

4. Requirements
4.1 Types of Glands

Type	Typical Use	Material	Notes
Steel Armoured Glands (SWA) – Sizes 0 to 7	MV/LV PVC or XLPE insulated, steel-wire armoured cables	Brass or galvanised steel	Complete with earth tags, locknuts, compression rings
PVC Glands (No. 1, 2, etc.)	For unarmoured LV control or service cables	Moulded PVC	UV-stabilised, weatherproof
Pratley PVC / Flame-proof Glands	Hazardous area or chemical-resistant terminations	Certified as per SANS/IEC Ex standards	Supplied with seals
Grip-type Steel Glands	For outdoor heavy duty mechanical support of armoured cables	Hot-dip galvanised steel	With slip-proof grip cone
Posi-Seal Glands	For watertight entries in kiosks and feeder pillars	Brass body with rubber compression seal	IP 65 or higher
Shrouds (Rubber / PVC)	For weather and UV protection over gland body	PVC or flexible rubber	Suitable sizes for each gland number (0–7)

4.2 Dimensional Range
- Gland sizes to suit cable diameters from 16 mm² to 300 mm².
- Shrouds to match each gland size (No. 0–7).
- Grip Glands and Posi-Seal Glands available in sizes 0–4.

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4.3 Marking

- Each gland to be permanently marked with size/type and manufacturer's ID.
- All components supplied bagged and tagged by size.

5. Tests & QA

- Type-tested to IEC 62444 / SANS 314 for:
  - Pull-out resistance
  - Impact strength
  - Sealing performance (IP rating)
  - Electrical continuity for armoured types
- Routine-tested for:
  - Dimensional accuracy
  - Thread fit
  - Material finish (galvanising thickness, UV-resistance)
- Test certificates to be supplied with each batch.

6. Packaging & Delivery

- Glands, shrouds, locknuts, washers and earth tags packed in sealed bags by size.
- Bundled in cartons or crates, labelled with size/type and quantity.
- Packaging to prevent corrosion, contamination or mechanical damage.

7. Documentation & Warranty

- Manufacturer's datasheets and installation instructions for each gland type.
- Conformance certificates for relevant standards.
- Warranty: 12 months from installation or 18 months from delivery.

Initials of Service Provider's Authority: .....

ITEM 35: SPECIFICATIONS FOR CABLE ENTRY PROTECTION & DUCTING

1. Scope
Supply and deliver cable sleeves, kicker pipes, and underground ducting for protecting LV and MV cables at entry points to poles, kiosks, plinths, and underground cable routes.

2. Applicable Standards
- SANS 791 – Unplasticised PVC (uPVC) pipes for buried service
- SANS 1283 – High-density polyethylene (HDPE) pipes for underground utilities
- SANS 121 / ISO 1461 – Hot-dip galvanising of steel components
- SANS 1091 – Colour coding for underground utilities (e.g. red for electrical cables)
- All products shall be manufactured under ISO 9001-certified quality management.

3. Service Conditions
- Suitable for use in 11 kV and 230/400 V municipal distribution networks
- For installation in coastal, high-humidity and polluted environments
- Resistant to UV radiation, moisture, soil chemicals and mechanical damage
- Designed to allow safe cable pulling, jointing and future maintenance.

4. Technical Requirements
4.1 Underground Ducts
- Material: HDPE or heavy-duty uPVC (class 6 or higher)
- Colours: Red or orange for electrical service
- Internal bore diameters:
  - 110 mm for standard LV feeders and small MV cables
  - 160 mm for larger MV or multiple LV cables
- Supplied in 6 m straight lengths or 50 m coils (HDPE)
- Smooth internal bore, free of sharp edges, to facilitate cable pulling
- Compatible with standard compression couplings and seals

4.2 Cable Sleeves for Entry at Poles and Plinths
- Material: Heavy-duty HDPE or uPVC
- Length: typically 1.2–1.5 m for pole bases and plinth entries
- Internal bore diameters:
  - 110 mm for LV cables
  - 160 mm for MV cables
- UV-stabilised for outdoor exposure

4.3 Kicker Pipes
- Material: Hot-dip galvanised steel to SANS 121 / ISO 1461
- Wall thickness: ≥2 mm
- Length: 1.2 m with 90° bend for routing underground cables into plinths or kiosks
- Galvanised finish for corrosion resistance in coastal environments

4.4 Marking and Identification
- All sleeves and ducts to be red or orange for electrical use

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- Each duct length to be marked with:
    - Manufacturer's name
    - Size
    - Class / pressure rating
    - Batch number and date of manufacture

5. Tests and Quality Assurance

- Ducts tested per SANS 791 / 1283 for:
    - Dimensional accuracy
    - Impact and crush resistance
    - Tensile strength
    - UV stability (for outdoor exposed sections)
- Galvanised kicker pipes tested for:
    - Galvanising thickness and adhesion
- Certificates of conformity to be provided for all components

6. Packaging and Delivery

- Ducts supplied in standard lengths (6 m) or coils (HDPE), capped at both ends to prevent contamination
- Sleeves and kicker pipes supplied in bundles, with protective wrapping for transit
- All items clearly labelled by size and type

7. Documentation and Warranty

- Manufacturer's datasheets and test certificates to accompany each batch

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ITEM 36: SPECIFICATIONS FOR SAFETY & DANGER SIGNS

1. Scope

Supply and deliver MV and LV danger signs for use on poles, kiosks, mini-substations, cabinets, and other electrical installations.

Signs may be supplied as either:

- Rigid Chromadek steel plates for fixed installations, or
- UV-printed adhesive vinyl stickers for direct application to smooth kiosk or cabinet surfaces.

2. Applicable Standards

- SANS 1186 – Safety signs
- SANS 1882 – Adhesive label performance (for outdoor use)
- ISO 9001 – Quality management
- Local municipal requirements for electrical safety signage

3. Service Conditions

- Outdoor use in inland and coastal environments
- UV-resistant, weatherproof, moisture-resistant
- Minimum service life:
  - Chromadek plates: 10 years
  - Vinyl stickers: 5 years (no fading or peeling)

4. Requirements

4.1 Rectangular MV Danger Sign

- Dimensions: 270 mm × 120 mm
- Material: 0.6 mm Chromadek steel
- Printing: Direct UV print on Chromadek for weather resistance
- Mounting:
  - Pre-drilled with 4–6 holes for secure fixing
  - Self-adhesive sticker on clean smooth surface
- See attached image for layout and appearance

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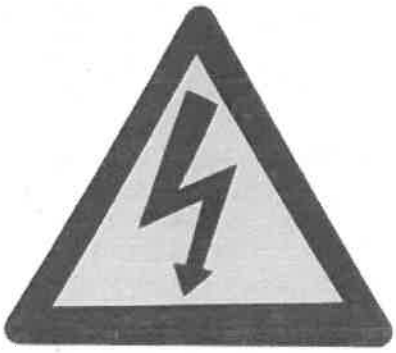
4.2 Rectangular LV Danger Sign

- Dimensions: 270 mm × 120 mm
- Material: 0.6 mm Chromadek steel
- Printing: Direct UV print on Chromadek for weather resistance
- Mounting:
  - Pre-drilled with 4–6 holes for secure fixing
  - Self-adhesive sticker on clean smooth surface
- See attached image for layout and appearance

4.3 Triangular Danger Sign

- Dimensions: 290 mm × 290 mm
- Material: 0.6 mm Chromadek steel
- Printing: Direct UV print on Chromadek for weather resistance
- Mounting:
  - Pre-drilled with 4–6 holes for secure fixing
  - Self-adhesive sticker on clean smooth surface
- See attached image for layout and appearance



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5. Tests & Quality Assurance

- Chromadek plates: Corrosion-resistance, adhesion and print durability to outdoor standards
- Stickers: Adhesion, UV-fade resistance, peel-strength and weather-exposure tests
- Manufacturer: ISO 9001-certified
- Warranty:
  - Chromadek: ≥ 12 months against corrosion/peeling/fading
  - Stickers: ≥ 12 months against premature peeling or UV-fade

6. Packaging & Delivery

- Signs packed flat with protective layer to prevent scratches
- Stickers supplied in sheets or rolls, labelled by type
- Packaging moisture-resistant and clearly marked by sign type and quantity

Initials of Service Provider's Authority: .....

ITEM 37: SPECIFICATIONS FOR PUMP STATION CONTROL & ELECTRICAL ACCESSORIES

1. Scope
Supply and deliver electrical control components, relays, switches, contactors, protective devices, and associated consumables for use in pump station panels and field installations for municipal water and wastewater applications.

2. Applicable Standards
- SANS 60947-1 / -2 / -4-1 – Low-voltage switchgear, circuit breakers and motor starters
- SANS 60947-5-1 / -5-4 – Control-circuit devices and switching elements
- SANS 61058 – Switches for appliances
- IEC 60255 / IEC 60947-8 – Control relays and timers
- SANS 60529 – Enclosure IP protection
- ISO 9001 – Quality management system
- Products to be certified and tested to the relevant SANS/IEC standards.

3. Service Conditions
- Equipment suitable for use in electrical control panels for pumps and ancillary equipment
- Operates on 24 V DC, 24–250 V AC / 50 Hz as specified for each item
- Components rated for continuous service in humid pump-station environments
- Designed for ambient temperatures up to 50 °C and relative humidity up to 95 % (non-condensing)

4. Requirements
4.1 Control & Protection Devices
- Start / Stop push-buttons: industrial type, complete with contacts
- Emergency stop push-buttons: lockable, mushroom-head, twist-release
- Reset push-buttons: momentary, for control circuits
- Auxiliary contacts: snap-on or DIN-rail mounted for contactor extension
- Control relays:
  - 24 V DC and 250 V AC versions as required
  - Plug-in or DIN-rail mount with socket bases
- Contactors:
  - 1.5 A, 60 A, 100 A
  - Coil voltages: 230 V AC / 400 V AC
  - Conforming to IEC / SANS 60947-4-1 for motor duty
- Motor protection overload relays:
  - Ranges: 3.7–5.5 A; 6–15 A; 20–35 A; 40–60 A
  - Adjustable thermal type, trip-class 10 or 20
- Control fuses: 2 A (HRC type) for control circuits
- Indication lamps: panel-mount type, 24 V AC / DC, LED type
- On-delay timers: adjustable timing range (e.g., 0.1–10 s / 1–30 s)
- Star–Delta timers: adjustable, for motor starting
- Flip-flop relays: for alternation of duty/standby pumps
- Liquid level control relays: for conductive probes or float-switch control
- Pressure switches / sensors:
  - Switch rating: ≥ 5 A at 230 V AC

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  - Sensor types: 0–10 bar, output 4–20 mA or equivalent for pump control
- Float switches:
  - Types: 24 V and 220 V AC
  - Suitable for water and sewage applications (resistant to sludge and grease)
- Solenoid valves: normally closed, 230 V AC rated

4.2 Other Electrical & Mechanical Consumables

- Motor relays:
  - AC: 24...240 V
  - DC: 24...240 V
- Lubrication grease: suitable for pump and motor bearings
- Gear oil: for gearbox-driven pumps
- Pump oil: as recommended by pump OEM
- Sealant compounds: including Loctite thread sealant and approved joint sealers
- Cleaning solvents: non-corrosive, for electrical and mechanical cleaning

5. Tests & Quality Assurance

- All electrical devices to be type-tested per relevant SANS / IEC standard
- Routine-tested for correct operation, insulation resistance, and contact integrity
- Certificates of compliance to be provided with each delivery batch
- Supplier must maintain ISO 9001 certified QA system

6. Packaging & Delivery

- Components to be delivered in manufacturer's original packaging
- Clearly marked with model, rating, voltage, and batch number
- Small items (fuses, contacts, sealants) to be boxed and labelled by size and type
- Consumables (lubricants, sealants) to be supplied in sealed containers with manufacturer's safety datasheets

7. Documentation & Warranty

- Installation and wiring instructions to be provided for all control devices
- Warranty:
  - Electrical control devices: minimum 12 months from installation
  - Consumables (oils, grease, sealants): as per manufacturer's shelf-life and product guarantee

Initials of Service Provider's Authority: .....

ITEM 38: SPECIFICATIONS FOR BATTERY TRIPPING UNITS & SUBSTATION DC

1. Scope
Supply and deliver complete battery tripping units (BTUs) with chargers, DC distribution boards, and associated stationary battery banks for use in municipal 11 kV substations for breaker tripping, control, protection relays, and auxiliary DC loads.

2. Applicable Standards
- IEC 60255 – Control, tripping, and protection relays
- IEC 60623 / IEC 62259 – Stationary Nickel-Cadmium cells
- IEC 60896 – Stationary VRLA lead-acid batteries
- IEC 62619 – $LiFePO_4$ battery safety requirements
- IEC 60335-2-29 – Battery chargers
- IEC 61439 – Low-voltage switchgear assemblies (for DC distribution board)
- SANS 10142 – Wiring Code
- ISO 9001 / ISO 14001 – Quality & Environmental Management

3. Service Conditions
- Indoor installation in substations
- Ambient temperature: –5 °C to +45 °C
- Relative humidity: up to 95% non-condensing
- DC system voltage: 24 V DC or 30 V DC nominal (to suit switchgear and relays)
- Designed for continuous float-charge operation with at least 8 hours autonomy at full connected load

4. Requirements
4.1 Battery Tripping Unit (BTU) Panel
- Metal-enclosed, floor-standing or wall-mounted, IP42 minimum
- Integrated with:
  - Float cum boost battery charger (input 230 V AC ±10%, 50 Hz)
  - DC distribution with MCBs for individual loads
  - DC ammeter and voltmeter with low/high voltage alarms
  - Low-voltage DC cut-off relay and audio-visual alarm
  - Temperature-compensated charging
  - Potential-free contacts for SCADA alarm integration
- Charger efficiency ≥ 90%
- Ripple voltage < 2%
- Over-voltage, short-circuit, and reverse-polarity protection
- Supplied completely wired, tested, and ready for installation

4.2 Stationary Batteries
Bidders may supply VRLA, Ni-Cd, or $LiFePO_4$ batteries, provided they meet the following:
General:
- Nominal system voltage: 24 V DC
- Rated capacity: typically 40–65 Ah for substation tripping duty (as per BOQ)
- Float life: ≥ 10 years at 25 °C (VRLA / $LiFePO_4$) or ≥ 15 years (Ni-Cd)
- Supplied with:

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- Acid-resistant racks (for VRLA / Ni-Cd)
- Inter-cell connectors and insulated terminal covers
- Marked polarity and installation manual

VRLA Lead-Acid:

- IEC 60896 compliant
- Maintenance-free, sealed type
- Design life ≥ 10 years
- Self-discharge ≤ 3% per month at 25 °C

Nickel-Cadmium (Ni-Cd):

- Pocket-plate or sintered-plate type
- IEC 60623 / IEC 62259 compliant
- Operating temperature: –20 °C to +50 °C
- Maintenance interval ≥ 2 years at 25 °C
- Cycle life ≥ 3 000 cycles at 80% DOD

$LiFePO_4$ (Optional):

- IEC 62619 compliant
- Integrated battery management system (BMS)
- Cycle life ≥ 3 500 cycles at 80% DOD
- Maintenance-free, compact design

5. Tests & QA

- Type-test certificates for BTU, charger, and batteries to be provided
- Routine-test results for every supplied unit
- Factory acceptance testing (FAT) available on request
- Batteries tested for capacity at delivery
- Supplier to be ISO 9001 certified

6. Packaging & Delivery

- BTU panels to be supplied in robust, moisture-resistant crates
- Batteries to be individually packed with terminal protectors
- Clear labelling with make, model, voltage, capacity, and manufacturing date

7. Documentation & Warranty

- Complete technical manuals for charger, BTU, and batteries
- Circuit diagrams and maintenance instructions
- Warranty:
  - BTU panels: ≥ 2 years
  - Batteries: ≥ 5 years for VRLA, ≥ 10 years for Ni-Cd, ≥ 5 years for $LiFePO_4$

Initials of Service Provider's Authority: .....

ITEM 39: SPECIFICATIONS FOR SMART ELECTRONIC LOCKS FOR SUBSTATIONS & KIOSKS

1. Scope

Supply and deliver smart electronic locking hardware for municipal substations, kiosks, and other secure enclosures, including:

- High-security electronic padlocks for outdoor use on mini-sub doors, gates, kiosks.
- Electronic Euro-profile cylinders for cabinet or kiosk doors.
- Programmable electronic keys with NFC/Bluetooth.
- GSM / portable sync modules and charging accessories.

The system shall support secure digital access control for multiple sites, including programmable access rights, time-window restrictions, audit trails, remote blacklisting of lost keys, and firmware upgrades.

2. Applicable Standards

- IEC 60529 – Degrees of protection (IP ratings)
- ISO 9001 – Quality management for manufacturer
- IEC 62619 – Safety requirements for lithium battery-powered keys
- IEC 62368-1 – Low-voltage electronic control equipment safety
- SANS 1186 – Safety markings for outdoor equipment

3. General Requirements

- Retrofit-capable: Padlocks and cylinders must be mechanically compatible with existing doors, kiosks, and mini-subs (Euro-profile standard where applicable).
- Access control: Keys shall support:
  - Programmable access rights & time scheduling
  - Audit trails for all key & lock transactions
  - Remote blocking / blacklisting of lost keys
- Keys: NFC + Bluetooth enabled, rechargeable, minimum IP67, secure AES128 or better encrypted communication.
- Locks: Must be electronic-core type (no battery required in lock), with mechanical robustness suited to heavy outdoor municipal use.
- Outdoor durability: Corrosion-resistant body (stainless, plated steel or composite), sealed electronics, operating range −20 °C to +60 °C, humidity up to 95 % RH.
- System platform: Must include a secure cloud/web-based management platform accessible on desktop and mobile devices for issuing key authorisations, revoking keys, scheduling, and reporting.

4. Product Categories

4.1 Smart Electronic Padlocks

- High-security hardened steel padlocks (≥ 11 mm shackles) for outdoor kiosk and mini-sub doors.
- Medium-duty composite padlocks (6 mm shackle) for general outdoor use.
- Closed-shackle variants for enhanced anti-cutting resistance.
- Corrosion-resistant body (plated steel, zinc-die-cast or weatherproof composite).
- Fully programmable digital core compatible with smart keys, with full audit-trail support.
- Key-retaining / non-key-retaining versions as required.

4.2 Smart Euro-Profile Cylinders

- Thumbturn and single-sided cylinders for cabinet / kiosk doors.

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- Brass or stainless body, satin or similar finish.
- Digital core IP67-rated; no internal battery required.
- Supports programmable access, audit trail, and remote blacklisting.
- Fits standard Euro-profile mortice locksets.

4.3 Smart Keys

- NFC + Bluetooth communication with locks.
- Qi wireless or inductive charging.
- ≥ 2 MB onboard memory for event storage.
- Automatic background sync via smartphone app.
- Rugged outdoor-rated housing ≥ IP67.
- Secure AES128-bit or stronger encryption.

4.4 GSM / Sync Stations

- Fixed or portable GSM/USB sync units for key activation and audit uploads.
- Secure encrypted communication to central management platform.
- Backup battery for operation during power loss.
- Support for remote key blocking and re-authorisation.

5. Tests & Quality Assurance

- Locks & keys tested for ingress protection (IP67 min), mechanical strength and endurance.
- Keys tested for ≥ 100 000 insertions or operating cycles.
- All communication and firmware update processes must be encrypted.
- Manufacturer certified to ISO 9001; test certificates provided for each batch.

6. Documentation & Warranty

- Full technical manuals and installation guides.

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2.1.2 SPECIFICATION COMPLIANCY

2.1.2.1 Instructions to Bidders

1. Each bidder must complete the Specification Compliancy Table for every item or sub-category they are tendering for.

2. The compliancy tables must be read in conjunction with the corresponding detailed item specification under C3.1, which sets out the full technical and performance requirements.

3. If a bidder is not tendering on a specific item or sub-category, they are not required to complete the compliance table for that item or sub-category.

4. Important: If a bidder provides pricing for an item or sub-category but fails to meet the minimum requirements as stated in the corresponding compliance table, the item or sub-category may be disqualified from evaluation.

5. After all item-level compliance tables, a separate Specification Compliancy Statement is provided.
    - Bidders must complete this statement, indicating whether they comply with all requirements for each item or sub-category they have priced.

6. Note: Each item or sub-category will be evaluated and awarded separately. Compliance is assessed per item/sub-category.

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2.1.2.2 SPECIFICATION COMPLIANCY TABLES

ITEM 1
Compliance Schedule – Item 1: Mini-Substations

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 11 kV / 400 V distribution		
2	Factory-built, type-tested outdoor mini-substation		
3	Transformer ratings: 100 / 160 / 200 / 315 / 630 / 800 kVA		
4	Vector group Dyn11		
5	Cooling: ONAN, mineral oil IEC 60296		
6	Coastal-environment finish: Avocado-green (RAL 6011), ≥ 200 µm powder-coat		
7	Stainless-steel external fittings and danger signs		
8	MV compartment: RMU (2 × LBS + 1 × Fuse-Switch) or VCB, 12 kV, 16 kA / 3 s		
9	LV compartment: busbar 36 kA / 1 s, MCCB / ACB incoming		
10	Surge arresters (IEC 60099-4) on all MV phases		
11	Nameplate with ratings; bilingual safety notices		
12	Routine & type-test certificates provided		
13	Warranty: 24 months after commissioning / 30 months after delivery		

ITEM 2
Compliance Schedule – Item 2: Distribution Transformers

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 11 kV / 400 V (230 V 1-ph for specified small units)		
2	Outdoor oil-immersed transformer		
3	Pole-mounted ratings: 16 kVA 1-ph, 25 kVA 1-ph, 50 kVA, 100 kVA, 160 kVA, 200 kVA		
4	Plinth-mounted ratings: 100 kVA, 160 kVA, 200 kVA, 315 kVA, 630 kVA, 800 kVA		
5	Pole-mounted units with integral LV compartment (as per BOQ)		
6	Vector group Dyn11; tappings ±2 × 2.5 %		
7	Cooling ONAN; temperature-rise ≤ 60 °C above ambient		
8	Sealed-type tank with oil-level gauge, pressure-relief, drain & filter valves		
9	HV terminations: bushings / cable box as per rating		
10	LV terminations: bushings or cable box as per rating; neutral earthed		
11	Coastal-environment finish: hot-dip galvanised + epoxy / polyurethane, Avocado-Green (C12)		
12	Stainless-steel external fittings (304 / 316)		
13	Routine & type-test certificates provided		
14	Warranty: 24 months after commissioning / 30 months after delivery		

Initials of Service Provider's Authority: .....

ITEM 3

Compliance Schedule – Item 3.A & 3.B (Outdoor & Indoor RMUs)

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 11 kV ±10 %, 630 A continuous, short-circuit withstand ≥ 16 kA for 3 s		
2	Outdoor (A) / Indoor (B) arc-resistant enclosure, IP 54 or better		
3	Enclosure: hot-dip galvanised steel, Avocado-Green (RAL 6011), ≥ 200 µm epoxy-polyester powder-coat, salt-spray ≥ 1000 h		
4	Feeder ways: sealed-for-life SF_6 load-break switches		
5	Transformer-protection way: fuse-switch or vacuum circuit-breaker as per BOQ		
6	(Where applicable) 4-Way unit with dual transformer-protection ways		
7	5-Way unit with 4 × feeder LBS + 1 × transformer-protection way		
8	Mechanical interlocks, pad-lockable operating handles, mimic diagram, voltage-presence indicators IEC 61243-5		
9	Cable terminations: front-accessible, screened plug-in or heat/cold-shrink for XLPE cables		
10	Mechanical endurance ≥ 10 000 operations (LBS) and ≥ 5 000 operations (VCB)		
11	Routine & type-test certificates supplied		
12	Warranty: 24 months after commissioning / 30 months after delivery		

Compliance Schedule – Item 3.C (11 kV Indoor Metal-Clad Switchgear Panels)

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 11 kV ±10 %, 630 A continuous, short-circuit withstand ≥ 16 kA for 3 s		
2	Indoor metal-clad, withdrawable VCB panel construction		
3	Feeder / Incomer panel with VCB 630 A		
4	Bus-section panel with VCB and protection relays		
5	Metering panel with CTs / VTs and protection relays		
6	Routine & type-test certificates supplied		
7	Warranty: 24 months after commissioning / 30 months after delivery		

ITEM 4

Compliance Schedule – Item 4: Electrical Medium-Voltage (MV) Cable

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 11 kV ±10 %, 50 Hz, suitable for direct-burial or ducts in coastal conditions		
2	Conductor: high-conductivity stranded copper or aluminium per SANS 97 / IEC 60502-2		
3	XLPE insulation for new installations; PILC Table 18 / 19 for legacy network		

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4	Metallic sheath: lead sheath (PILC) or copper / aluminium screen (XLPE)		
5	Armour: galvanised steel wire / tape for direct-burial		
6	Outer sheath: black PVC ST2 or equivalent, marked with manufacturer, size, type, voltage every 1 m		
7	Minimum continuous drum length ≥ 300 m (unless agreed otherwise)		
8	Meets mechanical, flame-retardant and environmental tests per SANS 60332 & relevant cable standard		
9	Type-test certificates supplied for each cable type and size		
10	Routine-test reports supplied with each batch / drum		
11	Cable delivered on sealed, lagged drums, ends moisture-capped and labelled		
12	Warranty: 12 months after installation / 18 months after delivery		

ITEM 5
Compliance Schedule – Item 5: Electrical Low-Voltage (LV) Cable

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated 600/1000 V, 50 Hz, suitable for direct-burial or ducts in coastal conditions		
2	Conductor: high-conductivity stranded annealed copper or aluminium per SANS 1507		
3	XLPE insulation for LV power and single-core cables; PVC insulation for service cables		
4	Armoured types: PVC-bedded, galvanised-steel-wire-armoured (SWA) with black PVC outer sheath		
5	Unarmoured types: as per SANS 1507-6 for indoor / ducted use		
6	Service cables: split-concentric (Airdac) with pilot to SANS 1411-6		
7	Marked every metre with manufacturer, year, size, voltage rating and standard		
8	Minimum continuous drum length ≥ 500 m unless otherwise agreed		
9	Type-test certificates for each cable type and size		
10	Routine-test reports supplied with each batch / drum		
11	Drums robust, labelled, sealed and lagged for outdoor storage		
12	Warranty: 12 months after installation or 18 months after delivery		

ITEM 6
Compliance Schedule – Item 6: Overhead Line & Earthing Conductors

Clause No.	Requirement	Comply – Yes	Comply – No
1	All conductors suitable for outdoor coastal service		
2	Comply with relevant SANS / IEC standards (182-1, 182-2, 182-3 / 61089)		
3	Conductor sizes and properties as specified		

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4	Copper line conductor hard-drawn to SANS 182-2		
5	Copper earth wire to SANS 182		
6	ACSR conductors with corrosion-protected steel core		
7	AAAC conductors to SANS 182-3		
8	Conductor resistance at 20 °C within limits		
9	Mechanical strength and breaking load per SANS		
10	Supplied on robust drums, ends sealed and labelled		
11	Manufacturer ISO 9001-certified		
12	Type-tests for resistance, breaking load, stranding uniformity		
13	Routine tests for each production batch		
14	Test certificates provided with each delivery		
15	Warranty: 12 months from installation or 18 months from delivery		

ITEM 7

Compliance Schedule – Item 7: LV ABC Conductors and Service Drops

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for LV 230/400 V, 50 Hz, suitable for overhead installation in coastal environments		
2	XLPE-insulated aluminium conductors to SANS 1418-1		
3	Continuous operating temperature 90 °C for XLPE insulation		
4	LV ABC configurations: 3 × 70 + 54.6 + 25 mm²; 3 × 95 + 54.6 + 25 mm²; 3 × 120 + 70 + 25 mm²		
5	Service ABC drops: 2-core × 10 mm², 2-core × 16 mm², 2-core × 25 mm²		
6	Marked every metre with manufacturer, year, size, voltage rating and relevant SANS reference		
7	Designed for continuous coastal outdoor service, capable of withstanding local wind loading and mechanical tension		
8	Type-test certificates provided for each ABC size		
9	Routine-test reports supplied with each batch / drum		
10	Supplied on robust wooden / steel drums, clearly labelled with manufacturer, type, size, length, mass; ends sealed and capped against moisture ingress		
11	Warranty: 12 months after installation or 18 months after delivery		

ITEM 8

Compliance Schedule – Item 8 (Control, Pilot, Auxiliary, Internal Wiring & Flexible Cords)

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 300/500 V or 600/1000 V as specified, 50 Hz		
2	Suitable for indoor use in kiosks, panels, DBs, and for moderate outdoor/coastal exposure		
3	Conductor: high-conductivity annealed copper (solid for 1.5 / 2.5 mm², stranded for ≥ 4 mm²)		

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4	PVC insulation for house wire and control cables, per SANS 1507		
5	Flexible cords: PVC-insulated, stranded copper, 3-core or 4-core, 1.5 mm² or 2.5 mm², per SANS 1574		
6	Control / pilot cables: PVC/PVC, stranded copper conductors, 0.6/1 kV rating		
7	Core sizes and counts as per BOQ (e.g., 1.5 mm² / 2.5 mm² cores; 2-, 4-, 7-, 12-, 19-, 24-core)		
8	Internal / house wire supplied in colours: red, yellow, blue, black, white, green/yellow (earth)		
9	Marked every metre with manufacturer, year, size, voltage and relevant SANS standard		
10	Type-test certificates provided for each cable type and size		
11	Routine-test reports provided for each batch / drum / coil		
12	Drums or coils robust, labelled, sealed or wrapped for storage and transport		
13	Warranty: 12 months after installation or 18 months after delivery		

ITEM 9
Compliance Schedule – Item 9: Distribution Kiosks

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 230/400 V, 50 Hz distribution		
2	Designed for outdoor coastal service, UV- and corrosion-resistant		
3	Polyethylene kiosks: heavy-duty, UV-stabilised, grey, IP54 / IP55, double-door		
4	Polyethylene kiosk sizes: 4-way, 6-way, 9-way, 12-way as per BOQ		
5	3CR12 kiosks: heavy-duty coastal type, lockable, IP55, grey finish		
6	3CR12 kiosk sizes: 6-way, 9-way, 12-way as per BOQ		
7	Pole-mounted PE distribution boxes: 2-way, 3-way, 4-way, 12-way as per BOQ		
8	Doors: double-door with tamper-proof lock, stainless-steel hinges, vermin-proof vents		
9	All kiosks factory-pre-wired with busbars, fuse-switches / MCCBs as required		
10	Incoming / outgoing terminals sized for cables up to 300 mm²		
11	Routine- and type-test certificates provided for each unit		
12	Warranty: 12 months after installation or 18 months after delivery		

ITEM 10
Compliance Schedule – Item 10: Network Switch Disconnectors

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 12 kV, 50 Hz, outdoor/kiosk installation in coastal conditions		
2	Current ratings as per BOQ: 400 A / 630 A / 800 A		

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3	Short-time withstand: 16 kA for 3 s; load-break ≥ 200 A		
4	Gang-operated, triple-pole, with visible isolating gap		
5	Integral earthing switch, interlocked, visible position		
6	High-conductivity copper/silver-plated contacts with arcing horns		
7	Insulators: UV-resistant polymer or porcelain		
8	Indoor/kiosk enclosures: galvanised steel / 3CR12 stainless steel, IP54 min		
9	Operating mechanism: manual, pad-lockable; motorisation provision (motorised for A.7 & A.8)		
10	Mounting brackets & galvanised structures for pole installations		
11	Bimetallic lugs and termination hardware included		
12	Ground-level visible position indicator (OPEN / CLOSED / EARTHED)		
13	Type-test certificate: temp-rise, short-circuit, load-break, endurance		
14	Routine-test certificate: dielectric withstand, contact resistance, mechanical operation		
15	Units delivered fully assembled, tested, packaged with instructions		
16	Supplier provides manuals, certificates, declaration of compliance		
17	Warranty: 12 months after installation / 18 months after delivery		

ITEM 11

Compliance Schedule – Item 11: MV Circuit Breakers

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 12 kV, 50 Hz, suitable for coastal service		
2	Short-circuit breaking capacity: 16 kA for 3 s		
3	Continuous current ratings: 630 A / 800 A as per BOQ		
4	Breaker type: vacuum-interruption		
5	Indoor type: withdrawable, arc-resistant metal-clad panel		
6	Outdoor type: plinth-mounted, arc-resistant weather-proof enclosure		
7	Spring-charged, motor-charged operating mechanism		
8	Control voltage 110 V AC / 220 V AC / DC as specified		
9	Auxiliary contacts and SCADA interface provided		
10	Earthing blades and interlocks fitted		
11	Includes trip & closing coils, anti-pump relay, local/remote selector		
12	Spares provided: 1 set of aux contacts, trip coil & closing coil per 10 breakers		
13	Type-test certificates for breaking, dielectric, endurance		
14	Routine-test certificates for dielectric, contact resistance, mechanical operation		
15	Supplied complete, ready for installation, securely packaged		
16	Supplier provides manuals, certificates & spare-parts list		
17	Warranty: 12 months after installation / 18 months after delivery		

Initials of Service Provider's Authority: .....

ITEM 12

Compliance Schedule – Item 12: LV Circuit Breakers

Clause No.	Requirement	Comply – Yes	Comply – No
1	Rated for 230/400 V, 50 Hz, suitable for coastal service		
2	Breaking capacity: 36 kA @ 400 V (MCCBs), 50 kA @ 400 V (ACBs)		
3	Current ratings per BOQ: 125 A, 250 A, 400 A, 630 A, 800 A, 1000 A, 1250 A		
4	MCCB for ≤ 800 A, ACB for > 800 A		
5	Trip unit: thermal-magnetic or electronic with adjustable settings		
6	Mounting: fixed or withdrawable as required by kiosk or switchboard		
7	Terminals suitable for Cu/Al conductors up to 300 mm² with bi-metallic pads		
8	Auxiliary contacts provided for SCADA / remote indication		
9	Control voltage for shunt-trip / closing coil 110 V AC or 220 V AC/DC		
10	Motorised operators for ACBs as required		
11	Mechanical interlocks or pad-lockable handles for safe isolation		
12	Spare auxiliary contacts and trip coils supplied (1 set / 10 breakers)		
13	Type-test certificates supplied (breaking capacity, dielectric, endurance)		
14	Routine-test certificates supplied (contact resistance, dielectric, mechanical)		
15	Supplied complete, ready for installation, packed and labelled		
16	Supplier provides manuals and recommended spare-parts list		
17	Warranty: 12 months after installation / 18 months after delivery		

ITEM 13

Compliance Table – Item 13: Miniature Circuit Breakers (MCBs) & Earth-Leakage Devices

Clause No.	Requirement	Comply – Yes	Comply – No
1	Devices shall comply with IEC/SANS 60898-1 (≤125 A MCBs), SANS 60947-2 (industrial MCBs), IEC/SANS 61008-1 (RCCBs), IEC/SANS 61009-1 (RCBOs), and SANS 10142-1 wiring code.		
2	Rated for operation on 230/400 V, 50 Hz, suitable for indoor or enclosed outdoor kiosk/feeder-pillar installation in coastal conditions.		
3	MCBs shall have breaking capacities as scheduled in the BOQ — 3 kA or 6 kA @ 230/400 V.		
4	MCBs shall have rated currents from 6 A up to 125 A as scheduled in the BOQ.		
5	MCB tripping curves shall include C-curve as standard, with provision for B-curve or D-curve where required.		
6	RCCBs/RCBOs shall be provided in 2-pole (1-phase) or 4-pole (3-phase) configurations as required.		
7	RCCBs/RCBOs shall have residual-current sensitivities of 30 mA (for personal protection) or 100 mA (for distribution) as scheduled in the BOQ.		

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8	RCCBs/RCBOs shall have adequate short-circuit withstand capability and be coordinated with upstream breakers.		
9	All devices shall be clearly marked with manufacturer, model, current rating, breaking capacity (kA), tripping curve, number of poles, residual-current sensitivity (IΔn), and compliance standard.		
10	Devices shall be supplied with all required accessories (busbar combs, phase barriers, terminal covers, pad-lockable handles, test buttons and labels).		
11	Manufacturer shall be ISO 9001-certified and provide valid type-test certificates to relevant IEC/SANS standards.		
12	Devices shall undergo routine factory tests per applicable IEC/SANS standards; certified test reports to accompany each shipment.		
13	Devices shall be supplied in original labelled packaging providing protection against moisture and mechanical damage.		
14	Supplier shall provide conformity certificates, test reports, and installation/operating instructions.		
15	Warranty: 12 months from installation or 18 months from delivery, whichever occurs first; defective devices shall be replaced or repaired at supplier's cost.		

ITEM 14

Compliance Schedule – Item 14: MV & LV Cable Terminations, Joints, Clamps & Accessories

Clause No.	Requirement	Comply – Yes	Comply – No
1	Kits and components suitable for use on 11 kV MV and 230/400 V LV networks		
2	Kits supplied complete with all insulating, sealing, stress-control and mechanical parts for field installation		
3	Kits and components comply with IEC/SANS 60502-4 and IEC/SANS 61238-1		
4	Compression lugs and ferrules made of high-conductivity tinned copper or bi-metallic for Al–Cu transition		
5	Mechanical shear-bolt connectors permitted where specified and rated for 11 kV service		
6	MV outdoor terminations UV-resistant, weather-proof, include rain-sheds and all necessary hardware		
7	MV indoor terminations for dry-type switchgear/panel use, with stress-control tubing, sealing boots and all required components		
8	Straight-through joints for XLPE cables with heat-shrink, stress-control and moisture-seal layers		
9	Transition joints for PILC → XLPE supplied complete with insulating and mechanical transition sleeves		
10	LV terminations and joints suitable for 4-core PVC/XLPE cables up to 300 mm² Cu/Al		
11	All clamps, connectors, support hardware hot-dip-galvanised or stainless-steel for corrosion resistance		
12	All kits include illustrated installation instructions and require only standard		

	heat-shrink tools and compression crimping equipment		
13	Kits and components suitable for coastal outdoor and indoor use at –10 °C to +45 °C, RH up to 95 %		
14	Each kit or component supplied in sealed moisture-proof packaging, labelled with voltage class, conductor range, cable type, manufacturer and batch number		
15	Manufacturer ISO 9001-certified and provides valid type-test certificates		
16	Each kit batch routine-tested for insulation integrity, partial-discharge and dimensional compliance		
17	Certified type-test and routine-test certificates supplied with each delivery		
18	Warranty: 12 months from installation or 18 months from delivery; defective components replaced at supplier's cost		

ITEM 15

Compliance Schedule – Item 15: Connecting Devices (Lines)

Item No.	Description of Goods / Works	IEC / SANS Reference	Comply – Yes	Comply – No
1	Compression Mid-Span Joint – for AAC/AAAC/ACSR up to 50 mm²	IEC / SANS 61238-1		
2	Compression Mid-Span Joint – for AAC/AAAC/ACSR up to 95 mm²	IEC / SANS 61238-1		
3	Compression Mid-Span Joint – for AAC/AAAC/ACSR up to 185 mm²	IEC / SANS 61238-1		
4	Compression Mid-Span Joint – for AAC/AAAC/ACSR up to 300 mm²	IEC / SANS 61238-1		
5	Compression Dead-End (Strain) Clamp – for AAC/AAAC/ACSR up to 50 mm²	IEC / SANS 61238-1		
6	Compression Dead-End (Strain) Clamp – for AAC/AAAC/ACSR up to 95 mm²	IEC / SANS 61238-1		
7	Compression Dead-End (Strain) Clamp – for AAC/AAAC/ACSR up to 185 mm²	IEC / SANS 61238-1		
8	Compression Dead-End (Strain) Clamp – for AAC/AAAC/ACSR up to 300 mm²	IEC / SANS 61238-1		
9	Bolted Parallel-Groove (PG) Clamp – for Bare Line up to 50 mm²	SANS 182-3		
10	Bolted Parallel-Groove (PG) Clamp – for Bare Line up to 95 mm²	SANS 182-3		
11	Bolted Parallel-Groove (PG) Clamp – for Bare Line up to 185 mm²	SANS 182-3		
12	Bolted Parallel-Groove (PG) Clamp – for Bare Line up to 300 mm²	SANS 182-3		
13	Suspension Clamp – for AAC/AAAC/ACSR up to 50 mm²	SANS 182-1		
14	Suspension Clamp – for AAC/AAAC/ACSR up to 95 mm²	SANS 182-1		

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15	Suspension Clamp – for AAC/AAAC/ACSR up to 185 mm²	SANS 182-1		
16	Suspension Clamp – for AAC/AAAC/ACSR up to 300 mm²	SANS 182-1		
17	Strain (Dead-End) Clamp – for AAC/AAAC/ACSR up to 50 mm²	SANS 182-2		
18	Strain (Dead-End) Clamp – for AAC/AAAC/ACSR up to 95 mm²	SANS 182-2		
19	Strain (Dead-End) Clamp – for AAC/AAAC/ACSR up to 185 mm²	SANS 182-2		
20	Strain (Dead-End) Clamp – for AAC/AAAC/ACSR up to 300 mm²	SANS 182-2		
21	Armour Rods – for Conductor Protection up to 50 mm²	SANS 182-2		
22	Armour Rods – for Conductor Protection up to 95 mm²	SANS 182-2		
23	Armour Rods – for Conductor Protection up to 185 mm²	SANS 182-2		
24	Armour Rods – for Conductor Protection up to 300 mm²	SANS 182-2		
25	Pre-formed Line Tie – for Pin Insulator up to 50 mm²	SANS 182-1		
26	Pre-formed Line Tie – for Pin Insulator up to 95 mm²	SANS 182-1		
27	Pre-formed Line Tie – for Pin Insulator up to 185 mm²	SANS 182-1		
28	Pre-formed Line Tie – for Pin Insulator up to 300 mm²	SANS 182-1		

ITEM 16

Compliance Schedule – Item 16: LV Underground Cable Connectors, Lugs & Ferrules

Clause No.	Requirement	Comply – Yes	Comply – No
1	All lugs, ferrules, connectors comply with IEC / SANS 60502-4, IEC / SANS 61238-1 and IEC / SANS 60998/60999		
2	Suitable for 230/400 V LV underground cables (PVC / XLPE) up to 400 mm²		
3	Suitable for use in kiosks, feeder pillars, DBs, mini-subs and underground reticulation		
4	Tinned copper compression lugs for copper conductors		
5	Bi-metallic compression lugs for Cu–Al transitions		
6	Ferrules for multi-stranded copper conductors		
7	All compression lugs and ferrules marked with conductor size and manufacturer's ID		
8	Mechanical shear-bolt lugs and connectors allowed for Cu–Al connections or where compression tools are impractical		
9	Mechanical connectors rated for full mechanical & electrical performance at LV service fault levels		
10	Heat-shrink terminations include boots, sealing, stress-relief components		
11	Heat-shrink straight-through joint kits include connectors, moisture seal, armour & screen continuity		
12	IPCs comply with IEC / SANS 61238-1 and suitable for ABC-to-cable or		

	branching; outdoor-rated ≥ IP54		
13	Earth-bond clamps made of corrosion-resistant tinned copper / stainless steel / brass		
14	All outdoor fasteners & brackets hot-dip galvanised or stainless steel		
15	Compression connectors compatible with standard hydraulic crimping tools		
16	All devices supplied with illustrated installation instructions		
17	Manufacturer ISO 9001-certified		
18	Valid type-test certificates for all products (lugs, ferrules, joints, IPCs, etc.)		
19	Each batch routine-tested for dimensional accuracy, mechanical strength & insulation resistance		
20	Supplied in sealed moisture-proof labelled packs indicating conductor size, insulation type, voltage rating & manufacturer/batch number		
21	Warranty: 12 months from installation or 18 months from delivery		

ITEM 17

Compliance Schedule – Item 17: Surge Arresters & Lightning Protection

Clause No.	Requirement	Comply – Yes	Comply – No
1	All surge arresters comply with IEC / SANS 60099-4 and IEC / SANS 60099-5		
2	Lightning protection components comply with IEC / SANS 62305 & IEC / SANS 62561		
3	All galvanised steel components comply with SANS 121		
4	All equipment suitable for outdoor use in coastal, high-humidity, high-pollution environment		
5	All external metallic components are corrosion-resistant (hot-dip galvanised steel or stainless steel)		
6	MV surge arresters are gapless, metal-oxide (ZnO) type without series gaps		
7	MV surge arresters rated for 11 kV network: Ur = 9–10 kV, continuous operating voltage Uc ≥ 80% of Ur		
8	MV surge arresters rated discharge current ≥ 10 kA (8/20 µs)		
9	MV surge arresters housing is polymeric (silicone / EPDM) or porcelain, UV & pollution-resistant		
10	MV surge arresters supplied complete with galvanised steel mounting brackets, line and earth terminals		
11	LV SPDs rated for 230/400 V, typically 275 V phase-to-neutral		
12	LV SPDs surge current rating: ≥ 20 kA per mode (Type 1 / Type 2 combination)		
13	LV SPDs pluggable or modular cartridge type for easy replacement		
14	LV SPDs include status indicators and remote signalling contact where required		
15	Air-termination rods copper-bonded, Ø 16 mm min.		
16	Down-conductors copper or aluminium, ≥ 25 mm² Cu cross-section		
17	Earth rods copper-bonded steel, Ø 16 mm × 2.4 m min., with corrosion-		

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	resistant clamps and inspection pits		
18	All bonding conductors & clamps hot-dip galvanised or stainless steel for outdoor service		
19	Each arrester set supplied with mounting brackets, earthing leads, clamps and tags as required		
20	LV SPDs supplied with appropriate disconnecting devices / fuses as recommended by manufacturer		
21	Manufacturer is ISO 9001-certified		
22	Surge arresters type-tested to IEC 60099-4 for residual voltage, energy handling, long-duration current impulse, and short-circuit behaviour		
23	Lightning protection components comply with IEC 62305 / IEC 62561 for mechanical strength, corrosion resistance and continuity		
24	All products routine-tested at factory for leakage current and visual inspection		
25	Certified type-test & routine-test certificates accompany each delivery batch		
26	All items packed in sealed, moisture-proof cartons with clear labels (rated voltage, class, manufacturer, model, batch no.)		
27	Mounting hardware, clamps and earth leads bagged and tagged by item type and size		
28	Warranty: 12 months from installation or 18 months from delivery, whichever occurs first		

ITEM 18

Compliance Schedule – Item 18: Line Hardware & Fasteners

Clause No.	Requirement	Comply – Yes	Comply – No
1	All steelwork hot-dip galvanised after fabrication to SANS 121		
2	Pole-top brackets, cross-arms, bolts & nuts comply with SANS 182-1 / 182-2 / 182-3 and IEC 61284		
3	Insulators (pin, post, strain) polymer type unless specified otherwise; UV-resistant for outdoor service		
4	Cross-arms for intermediate poles: 1.8 m – 2.1 m, supplied complete with mounting bolts, washers & locking devices		
5	Strain & stay assemblies: galvanised steel rods, stay-plates, insulators, thimbles & turnbuckles as per SANS construction practice		
6	All bolts, nuts & spring washers: galvanised high-tensile steel		
7	Pre-cast concrete plinths: 25–30 MPa reinforced concrete, Y12 steel, 2 × lifting holes, sizes as specified for RMU, mini-sub or LV kiosk		
8	Products manufactured under ISO 9001 certified quality system		
9	Type-tested to IEC 61284 / SANS 182 for mechanical strength & corrosion resistance		
10	Routine-tested for dimensional accuracy & galvanising thickness; test certificates supplied with each batch		
11	Packaged & labelled by component type; bolts & washers to be bagged &		

	tagged		
12	Warranty: 12 months after installation or 18 months after delivery, whichever occurs first		

ITEM 19
Compliance Schedule – Item 19: 11 kV Line Construction – Connectors

Clause No.	Requirement	Comply – Yes	Comply – No
1	Connectors comply with IEC / SANS 61238-1 and IEC / SANS 61284 for mechanical & electrical performance		
2	All compression sleeves, dead-end connectors, PG clamps and tap-off connectors are compatible with AAAC / ACSR / Cu conductors up to sizes specified in BOQ		
3	Connectors withstand rated mechanical tension, thermal cycling and short-circuit fault currents without deterioration		
4	All metallic components are corrosion-resistant (aluminium alloy or hot-dip galvanised steel; stainless-steel spring washers where required)		
5	Compression sleeves/joints are aluminium or bi-metallic Cu-Al for permanent splices		
6	PG clamps provided for jumper and tee-off connections, with galvanised bolts & stainless-steel spring washers		
7	Hot-line / tapping clamps approved for live-line use		
8	Shear-bolt connectors permitted for field use and tested for full mechanical and electrical performance		
9	Products manufactured under ISO 9001 certified quality system		
10	Type-tested for electrical resistance, temperature rise, tensile strength, thermal cycling & corrosion resistance		
11	Routine-tested for dimensional accuracy and galvanising; certified test certificates supplied with each batch		
12	Supplied in sealed moisture-proof packs, labelled with conductor size, type, voltage class and batch number		
13	Small items (e.g. bolts, washers) to be bagged and tagged		
14	Warranty: 12 months after installation or 18 months after delivery, whichever occurs first		

ITEM 20
Compliance Schedule – Item 20: 11 kV Line Construction – Pre-Formed Line Fittings

Clause No.	Requirement	Comply – Yes	Comply – No
1	Fittings comply with IEC / SANS 61284 for overhead line fittings		
2	Suitable for AAAC, ACSR and copper conductors as specified in the BOQ		
3	Designed for 11 kV (Um 12 kV) network and coastal, UV-exposed, polluted environments		
4	Pre-formed dead-end grips provide full mechanical and electrical		

	performance without damaging conductor		
5	Pre-formed suspension clamps / ties reduce vibration fatigue and securely support conductor at intermediate poles		
6	Pre-formed armour rods protect conductors against abrasion at suspension and strain points		
7	Pre-formed guy grips suitable for stay-wire sizes (e.g. 7/4.00 mm) providing full rated strength without damage		
8	All fittings manufactured from high-strength aluminium alloy or galvanised steel		
9	All fittings clearly marked with conductor size and manufacturer's ID		
10	Manufactured under ISO 9001 certified quality management system		
11	Type-tested to IEC / SANS 61284 for mechanical strength, slip load and electrical continuity		
12	Routine-tested for dimensional conformity and coating quality; certified test certificates provided		
13	Supplied in bundled, moisture-protected cartons labelled with conductor size, type and batch number		
14	Warranty: 12 months after installation or 18 months after delivery, whichever occurs first		

ITEM 21

Compliance Schedule – Item 21: Cable Ties, Cleats & Identification Accessories

Item No.	Description of Goods / Works	IEC / SANS Reference	Comply – Yes	Comply – No
A. Cable Ties & Banding				
A.1	Nylon Cable Tie – UV-Resistant, 150 mm × 3.6 mm (Outdoor Grade)	IEC 62275 / ISO 4892 (UV)		
A.2	Nylon Cable Tie – UV-Resistant, 300 mm × 4.8 mm (Outdoor Grade)	IEC 62275 / ISO 4892 (UV)		
A.3	Nylon Cable Tie – UV-Resistant, 450 mm × 7.6 mm (Outdoor Grade, Heavy-Duty)	IEC 62275 / ISO 4892 (UV)		
A.4	Nylon Cable Tie – UV-Resistant, 600 mm × 9.0 mm (Outdoor Grade, Heavy-Duty)	IEC 62275 / ISO 4892 (UV)		
A.5	Stainless-Steel Cable Tie – 304 Grade, 7.9 mm × 360 mm (Heavy-Duty for Outdoor Cable Securing)	IEC 62275 / SANS 121 (Galv. Coating)		
A.6	Stainless-Steel Cable Tie – 304 Grade, 7.9 mm × 520 mm (Heavy-Duty for Outdoor Cable Securing)	IEC 62275 / SANS 121 (Galv. Coating)		
A.7	Stainless-Steel Banding – 304 Grade, 12.7 mm Wide	IEC 62275 / SANS 121		
A.8	Galvanised Binding Wire – 1.6 mm Ø	SANS 675 / SANS 121		
B. Cable Cleats & Clamps				
B.1	Single-Hole PVC Cable Cleat – for LV Cable up to Ø25 mm	IEC 61914		
B.2	Single-Hole PVC Cable Cleat – for LV Cable up to	IEC 61914		

Initials of Service Provider's Authority: .....

	Ø50 mm			
B.3	Single-Hole PVC Cable Cleat – for LV Cable up to Ø75 mm	IEC 61914		
B.4	Two-Bolt Aluminium Trefoil Cable Clamp – for MV Cable up to Ø50 mm	IEC 61914		
B.5	Two-Bolt Aluminium Trefoil Cable Clamp – for MV Cable up to Ø75 mm	IEC 61914		
B.6	Two-Bolt Aluminium Trefoil Cable Clamp – for MV Cable up to Ø90 mm	IEC 61914		
B.7	Galvanised Saddle Clamp with Bolt & Nut – for Securing Cables to Poles / Structures	SANS 182 / SANS 121		
B.8	Insulated Cable Hanger / Hook – for Temporary Support during Cable Laying	IEC 619		

ITEM 22

Compliance Schedule – Item 22: MV Fuses & Drop-Out Cut-Outs

Clause No.	Requirement	IEC / SANS Reference	Comply – Yes	Comply – No
1	Outdoor 11 kV drop-out expulsion fuse assembly with mounting hardware	IEC/SANS 60282-2		
2	Drop-out fuse visible isolation, typical breaking range 8–16 kA for transformer HV protection	IEC/SANS 60282-2		
3	HRC current-limiting fuse links for RMU / switchgear, Ur = 12 kV, Isc ≥ 50 kA	IEC/SANS 60282-1		
4	Transformer protection characteristic E-type / gTr	IEC 60644		
5	Fuse marking: manufacturer, rated current, voltage, type	SANS 1411-1		
6	Manufacturer quality management certification	ISO 9001 / 14001		

ITEM 23

Compliance Schedule – Item 23: LV Fuses & Carriers

Clause No.	Requirement	IEC / SANS Reference	Comply – Yes	Comply – No
1	LV fuse links rated 230/400 V AC, 50 Hz for kiosks, feeder pillars and LV switchboards	IEC/SANS 60269-1/2/3		
2	NH-type HRC fuse links, blade-type, 63 A–400 A, 500 V AC minimum	IEC/SANS 60269-2		
3	DO-type HRC fuse links, 63 A–200 A, 500 V AC minimum	IEC/SANS 60269-2		
4	Cylindrical / cartridge control fuses, 2 A–32 A, 500 V AC minimum	IEC/SANS 60269-2		
5	Rated breaking capacity ≥ 80 kA at 400 V AC for all main LV fuses (NH & DO)	IEC/SANS 60269-2/3		
6	Characteristics gG / gL for general use, aM for motor circuits where specified	IEC/SANS 60269-2		

Initials of Service Provider's Authority: .....

7	Service-connection cut-out carriers and fuse links, 60 A & 100 A, 500 V AC	IEC/SANS 60269-2/3		
8	Carriers made from flame-retardant, UV-stabilised polymer with shrouded live parts	IEC/SANS 60269-2/3		
9	Terminals suitable for copper and aluminium conductors	IEC/SANS 60269-2		
10	Marking on each fuse: manufacturer, rated current, rated voltage, breaking capacity	SANS 1411-1		
11	Type-tested for breaking capacity, time-current, power loss, temperature rise	IEC/SANS 60269-1/2/3		
12	Routine-tested for dimensions, resistance and visual quality	IEC/SANS 60269-1		
13	Manufacturer certified to ISO 9001 / 14001	ISO 9001 / 14001		
14	Packaging: sealed moisture-proof cartons, labelled with fuse type, size, rating	IEC/SANS 60269-2		
15	Warranty: 12 months from installation or 18 months from delivery	–		

ITEM 24

Compliance Schedule – Item 24: Distribution Line Poles

Clause No.	Requirement	IEC / SANS Reference	Comply – Yes	Comply – No
1	Wooden poles treated with CCA / creosote, supplied with treatment certificate & stamped	SANS 457-2, SANS 10199		
2	Wooden poles meet top diameter requirement per length class (9 m ≥140 mm, 14 m ≥180 mm)	SANS 457-2		
3	Galvanised steel poles hot-dip coated inside & outside, 4–5 mm wall thickness	SANS 10322		
4	Galvanised steel poles with welded base plate & earthing provision	SANS 10322		
5	Fibreglass poles UV-stabilised, flame-retardant, corrosion-resistant, per SANS standard	SANS 10280		
6	Fibreglass poles available in 7–12 m (LV/streetlight) & ≥9–14 m for MV line replacement	SANS 10280		
7	Concrete poles manufactured to meet load class and strength requirements	SANS 470		
8	Expected service life: ≥30 years (wood), ≥40 years (steel, composite, concrete)	–		
9	Batch test certificates: treatment retention, galvanising, tensile & bending strength	Relevant SANS per material		
10	Marking on each pole: manufacturer, length, class, date of treatment / manufacture	–		
11	Packaging: supplied in bundles with protective spacers	–		

Initials of Service Provider's Authority: .....

12	Warranty: ≥10 years (wood), ≥15 years (steel/composite), ≥15 years (concrete)	–		

ITEM 25

Compliance Schedule – Item 25: Streetlighting and Accessories

Section	Specification Requirement	Comply – Yes	Comply – No
A. LED Streetlight Luminaires (Back- and Bottom-Entry)			
A.1	LED streetlight luminaire – wattage options 20 W / 36 W / 44 W / 50 W		
A.2	Luminaire ingress protection rating ≥ IP65		
A.3	Impact resistance ≥ IK08		
A.4	Luminous efficacy ≥ 120 lm/W		
A.5	Colour temperature 4000–5000 K (Cool White)		
A.6	Integrated LED driver with power factor ≥ 0.95		
A.7	Total harmonic distortion (THD) ≤ 10 %		
A.8	Surge protection device ≥ 10 kV		
A.9	Expected lifetime ≥ 50 000 h at L70		
A.10	Die-cast aluminium corrosion-resistant housing		
A.11	Optics suitable for Type II / III road-lighting distribution		
A.12	Mounting suitable for 42–60 mm spigot outreach brackets		
B. LED Floodlights / Area Lighting			
B.1	LED floodlight wattage options 50 W / 100 W / 200 W / 250 W / 400 W / 455 W		
B.2	Ingress protection ≥ IP66		
B.3	Surge protection ≥ 10 kV		
B.4	Power factor ≥ 0.95		
B.5	THD ≤ 10 %		
B.6	Die-cast aluminium housing with tempered-glass cover		
B.7	Suitable for pole or wall mounting		
C. Post-Top LED Luminaires (ZELA-type)			
C.1	Post-top luminaire wattage options 20–22 W and 36–38 W		
C.2	Ingress protection ≥ IP66		
C.3	Impact resistance ≥ IK08		
C.4	Neutral-White 4000 K LED (std)		
C.5	Spigot mounting Ø76 mm, ≥ 80 mm insertion depth		
C.6	Power factor ≥ 0.95		
C.7	Surge protection ≥ 10 kV / 10 kA		
C.8	Luminaire efficacy ≥ 120 lm/W		
C.9	Lifetime ≥ 100 000 h for LEDs (L70B10), ≥ 80 000 h for driver		
D. LED Lamps & Tubes			
D.1	LED bulbs 6 W / 9 W / 12 W / 18 W		
D.2	LED tubes 36 W – 1.2 m & 1.5 m Cool White		
D.3	Other lamp types: 13 W BC/ES, 16 W × 2D, 20 W & 30 W E27		

Initials of Service Provider's Authority: .....

D.4	Luminous efficacy ≥ 100 lm/W		
D.5	Colour temperature 4000–5000 K		
D.6	Lifetime ≥ 25 000 h		
E. Solar LED Streetlight			
E.1	100 W integrated solar streetlight unit		
E.2	Includes mono-crystalline PV panel, $LiFePO_4$ battery & charge controller		
E.3	≥ 12 h nightly operation		
E.4	≥ 3 days battery autonomy		
E.5	Weatherproof housing ≥ IP65		
F. Daylight Switches / Photocells			
F.1	Outdoor daylight switch, DLS LS16 domed type and 20 mm compact sensor		
F.2	Operating voltage 230 V AC, 50 Hz		
F.3	Switch-on at ≤ 30 lux, switch-off at ≥ 80 lux		
F.4	IP65 UV-resistant housing		
F.5	Design life ≥ 50 000 operations		
G. Brackets & Mounting Hardware			
G.1	Streetlight brackets – outreach 300 mm, 500 mm, 1 000 mm		
G.2	Spigot 42–60 mm		
G.3	Hot-dip galvanised steel to SANS 121		
G.4	Clamps – aluminium/aluminium 2-bolt		
G.5	PG clamps – sizes 10, 12, 16, 20		
G.6	Wedge clamps, Crosby clamps – standard type		
G.7	Earth-spike clamps for pole earthing		
H. General Compliance & Warranty			
H.1	Luminaires comply with SANS 60598 type-tests (photometry, IP, electrical safety)		
H.2	Surge protection devices tested to IEC 61643		
H.3	Brackets & clamps galvanised to SANS 121, batch test certificates provided		
H.4	Packaging – cartons/bundles clearly marked by type, wattage & batch		
H.5	Warranty – ≥ 5 years for LED luminaires, ≥ 3 years for solar batteries & daylight switches		

ITEM 26

Compliance Schedule– Item 26 (A): Bulk Whole-Current Three-Phase Meter (Landis & Gyr E650 or Similar)

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Meter type	3-phase, 4-wire, whole-current smart meter		
2	Voltage	3×230/400 V, 50 Hz		
3	Current rating	Up to 100 A direct-connected		
4	Short-time withstand	≥ 30×In for 0.5 s		
5	Accuracy	Class 0.2 S or 0.5 S active energy; Class 2 reactive		
6	Four-quadrant metering	Measures import & export		
7	TOU	≥ 4 tariffs, ≥ 12 seasons, ≥ 50 switching events/day		

Initials of Service Provider's Authority: .....

8	Load profile	≥ 90 days @ 15-min intervals		
9	Demand recording	kW, kvar, kVA		
10	Event logging	Tamper, power fail/restore, cover open, reverse energy, dips/swells		
11	RTC	Drift ≤ 1 min/yr, backup ≥ 10 yrs		
12	Communication	Optical port + isolated RS-485, DLMS/COSEM		
13	Memory retention	≥ 12 months without power		
14	Firmware	Remotely upgradeable		
15	Protection	IP54 or higher		
16	Warranty	≥ 5 years		

Compliance Schedule – Item 26 (B): Bulk CT-Operated Three-Phase Meter (Landis & Gyr E650 or Similar)

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Meter type	3-phase, 4-wire, CT-operated smart meter		
2	Voltage	3×230/400 V, 50 Hz		
3	Current input	1 A or 5 A CT secondary		
4	Accuracy	Class 0.2 S or 0.5 S active energy; Class 2 reactive		
5	Four-quadrant metering	Measures import & export		
6	TOU	≥ 4 tariffs, ≥ 12 seasons, ≥ 50 switching events/day		
7	Load profile	≥ 90 days @ 15-min intervals		
8	Demand recording	kW, kvar, kVA		
9	Event logging	Tamper, power fail/restore, cover open, reverse energy, dips/swells		
10	RTC	Drift ≤ 1 min/yr, backup ≥ 10 yrs		
11	Communication	Optical port + isolated RS-485, DLMS/COSEM		
12	Memory retention	≥ 12 months without power		
13	Firmware	Remotely upgradeable		
14	Protection	IP54 or higher		
15	Auxiliary supply	Metering circuit or auxiliary 230 V AC		
16	Warranty	≥ 5 years		

ITEM 27

Compliance Schedule – Item 27 (A): Single-Phase Electronic Meter (Direct-Connected)

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Meter type	Static, 1-phase, 2-wire, direct-connected		
2	Nominal voltage	230 V AC, 50 Hz		
3	Rated current	Direct-connected up to 80 A (minimum) — preferable up to 100 A		
4	Accuracy	Class 1 or Class 0.5 S for active energy		
5	Display	Digital LCD, back-lit, with parameter scrolling		
6	Load profile	Minimum 60 days at 15-minute intervals		

7	Event logging	Tamper, reverse current, cover-open, phase fail, loss-of-voltage		
8	RTC	Real-time clock with ≤ 1 min/year drift, battery backup ≥ 10 years		
9	Data retention	≥ 12 months without power		
10	Communication	Optical port to IEC 62056-21 and RS-485 or equivalent port		
11	Protection	Meter enclosure and terminals sealed; IP54 or higher		
12	Firmware	Upgradeable locally or remotely		
13	Standards compliance	IEC/SANS 62052-11, 62053-21/23/24		
14	Warranty	≥ 5 years		

Compliance Schedule – Item 27 (B): Single-Phase Bi-Directional SSEG Meter (Kamstup Omnipower or Similar)

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Meter type	Static, 1-phase, 2-wire, bi-directional SSEG-capable		
2	Voltage	230 V AC, 50 Hz		
3	Current rating	Up to 100 A continuous		
4	Accuracy	Class 1 or 0.5 S active energy (import & export)		
5	Four-quadrant metering	Import & export separately		
6	Load profile	≥ 60 days @ 15-min intervals for import & export		
7	Event logging	Reverse flow, voltage dips, tamper, cover-open		
8	RTC	Drift ≤ 1 min/yr, backup ≥ 10 yrs		
9	Communication	DLMS/COSEM, optical + RS-485 / NB-IoT		
10	Data retention	≥ 12 months without power		
11	Protection	IP54 or higher		
12	Firmware	Remotely upgradeable		
13	Warranty	≥ 5 years		

ITEM 28

Compliance Schedule – Item 28: Current Transformers

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Standards	IEC/SANS 61869-1 & 61869-2		
2	Rated primary current	As specified in BOQ (e.g. 100 A up to 2000 A)		
3	Rated secondary current	5 A (or 1 A where specified)		
4	Accuracy class	Class 0.2 S or 0.5 S for metering		
5	Burden	≤ 10 VA (or as specified)		
6	Frequency	50 Hz		
7	Short-time thermal current (Ith)	≥ 40 × rated current for 1 second		
8	Dynamic current	≥ 2.5 × Ith		
9	Insulation level	LV: 0.72/3/20 kV; MV (11 kV): 12/28/75 kV		

Initials of Service Provider's Authority: .....

10	Core type	Low remanence metering core with shorting link		
11	Mounting	Bar primary / window type; outdoor types with SS bracket		
12	Terminals	Brass or tinned copper with captive screws for 2.5–16 mm² leads		
13	Markings	Ratio, accuracy class, burden, rated current, serial number, manufacturer		
14	Protection	IP54 for outdoor; IP40 for indoor		
15	Quality assurance	Type-tested and routine-tested, ISO 9001 manufacturer		
16	Warranty	≥ 5 years		

ITEM 29

Compliance Schedule – Item 29: Ready Board

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Rated voltage	230 V AC, 50 Hz		
2	Enclosure type	UV-stabilised thermoplastic / epoxy-coated steel, IP40 min.		
3	Main switch	30 A double-pole switch-disconnector		
4	Earth leakage unit	63 A double-pole RCD, 30 mA		
5	Circuit breakers	1 × 20 A MCB, 1 × 10 A MCB, 6 kA min.		
6	Bulkhead fitting	1 × IP54 bulkhead LED/energy-efficient lamp		
7	Socket-outlets	1 × 2×4 single plug, 1 × 4×4 double plug		
8	Internal wiring	SANS-compliant, copper, colour-coded, pre-wired		
9	Labelling	All devices clearly labelled; rating plate fixed		
10	Standards compliance	SANS 10142-1, SANS 60947-3, SANS 60898, SANS 61008		
11	Quality assurance	Type-tested & routine-tested, ISO 9001 manufacturer		
12	Warranty	≥ 24 months		

ITEM 30

Compliance Schedule – Item 30: Technical Compliance Table – Enclosures & Boxes

No.	Item	Material	IP Rating	Size (mm)	Mounting / Application	Lid & Fastening	Other Features	Comply – Yes	Comply – No
1	3-Way Pratley Box (No.1–4)	Heavy-duty PVC	≥IP54	As per standard sizes	Surface-mount junction	Gasketed lid with stainless screws	Flame-retardant, UV-resistant		
2	4-Way Box	Heavy-duty PVC	≥IP54	As per standard sizes	Surface-mount junction	Gasketed lid with stainless screws	For LV junctions in service boxes		
3	4×2 Wonder Box	Rigid PVC	≥IP20	100×50 approx.	Flush or surface wall mounting	Snap-on cover	For switches/outlets		
4	4×4 Wonder Box	Rigid PVC	≥IP20	100×100 approx.	Flush or surface wall	Snap-on cover	For switches/outlets		

Initials of Service Provider's Authority: .....

					mounting				
5	6-Way Box	Heavy-duty PVC	≥IP54	150×150 approx.	Surface-mount junction	Gasketed lid with screws	Heavy-duty junction		
6	3-Way Round Box – 20 mm	PVC	≥IP54	Ø70 approx.	Conduit junction (20 mm entries)	Screw-on lid	Flame-retardant		
7	3-Way Round Box – 25 mm	PVC	≥IP54	Ø70 approx.	Conduit junction (25 mm entries)	Screw-on lid	Flame-retardant		
8	Flush Box – 4×2	PVC	≥IP20	100×50 approx.	In-wall mounting	Metal/plastic faceplate (by installer)	For switches/outlets		
9	Flush Box – 4×4	PVC	≥IP20	100×100 approx.	In-wall mounting	Metal/plastic faceplate (by installer)	For switches/outlets		
10	PVC LAX 16	UV-resistant PVC	≥IP54	Medium junction size	Pole/wall junction	Screw-fixed lid with gasket	Outdoor heavy-duty		
11	PVC LAX 170	UV-resistant PVC	≥IP54	Large junction size	Pole/wall junction	Screw-fixed lid with gasket	Outdoor heavy-duty		
12	York Box J2	UV-resistant PVC	≥IP54	Approx. 200×150×100	Outdoor distribution junction	Gasketed lid with stainless screws	UV-resistant, weatherproof		
13	York Box J3	UV-resistant PVC	≥IP54	Approx. 250×200×120	Outdoor distribution junction	Gasketed lid with stainless screws	UV-resistant, weatherproof		
14	Box Lids (Standard)	PVC	–	To match York/Junction boxes	Replacement lids	Stainless screws, gasket	Compatible with York & LAX boxes		
15	Box Lids (Oversize)	PVC	–	To match York/Junction boxes	Replacement lids	Stainless screws, gasket	Extra coverage for larger terminations		
16	Plastic Pole-Mounting Box SPB1	Polyethylene	≥IP54	~400×300×200	Pole-mount enclosure	Lockable door with gasket seal	UV-resistant, outdoor use		
17	Pole/Wall Polyethylene Box 605×450	Polyethylene	≥IP54	605×450×250	Pole or wall mounting	Lockable double-hinged door with gasket	Weatherproof, UV-stabilised		

Initials of Service Provider's Authority: .....

18	Single-Phase Meter Box	UV-resistant thermoplastic	≥IP54	~400×300×200	Pole or wall mounted	Lockable hinged door, sealed	Transparent window for meter display		
19	Lock Meter Box	UV-resistant heavy-duty plastic/metal	≥IP54	~450×350×250	Pole or wall mounted	Reinforced lockable door, gasket	For secure metering installations		

ITEM 31

Compliance Schedule – Item 31: Electrical Consumables – Lugs & Ferrules

No.	Item	Material / Type	Size Range	Stud Hole / Style	Standard	Comply – Yes	Comply – No
1	Compression lugs (Cu)	Tinned copper	1.5–500 mm²	5–20 mm	IEC/SANS 61238-1		
2	Compression lugs (Al)	Aluminium alloy	16–500 mm²	6–20 mm	IEC/SANS 61238-1		
3	Bi-metallic lugs (Al-Cu)	Al barrel / Cu palm	16–500 mm²	6–20 mm	IEC/SANS 61238-1		
4	Triangular-palm lugs	Cu or Al	35–240 mm²	12 mm std	IEC/SANS 61238-1		
5	Soldering lugs	Tinned copper	60 A / 100 A / 200 A	–	IEC/SANS 61238-1		
6	Standard ferrules	Tinned copper	1.5–185 mm²	Crimp type	IEC/SANS 61238-1		
7	Solid-centre ferrules	Tinned copper	16–185 mm²	Crimp type	IEC/SANS 61238-1		
8	Aluminium ferrules (round / triangular)	Aluminium	50–150 mm²	Crimp type	IEC/SANS 61238-1		
9	Boot-lace ferrules	Tinned Cu, insulated DIN-coloured	0.5–50 mm²	–	DIN 46228		
10	Bundle ferrules	Colour-coded (grey, black, white, pink, yellow, orange)	1.5–50 mm²	–	IEC/SANS 61238-1		

ITEM 32

Compliance Schedule – Item 32: Electrical Consumables – Tapes & Safety Marking

No.	Type	Material	Colour / Pattern	Size / Thickness	Application	Standard	Comply – Yes	Comply – No
1	PVC insulation tape	Flame-retardant PVC	Red, Yellow, Blue, Black, Green/Yellow, White	19 mm × 0.18 mm	Phase identification	IEC 60454 / SANS 122		
2	HT Grey tape	High-temp PVC	Grey	19–25 mm × 0.18 mm	Heavy-duty LV/MV joints	IEC 60454		

Initials of Service Provider's Authority: .....

3	Self-amalgamating rubber tape	EPR / rubber	Black	19–25 mm × 0.75 mm	MV jointing & sealing	IEC 60454		
4	Impregnated tape	Protective resin-impregnated fabric	Black / Grey	Std. roll	Moisture barrier for joints	IEC / SANS 121		
5	Bitumen tape	Bitumen-coated fabric	Black	Std. roll	Corrosion protection for underground cable	IEC / SANS 121		
6	PTFE thread tape	PTFE	White	12.7 mm width	Thread sealing of glands & fittings	–		
7	Red & White barrier tape	Polyethylene	Red / White stripe	75–100 mm × ≥100 µm	Site barricading	SANS 1418		
8	Black & Yellow danger tape	Polyethylene	Black / Yellow stripe	75–100 mm × ≥100 µm	General hazard marking	SANS 1418		
9	Hazard / warning tape	Polyethylene	Black / Yellow or Red / White	75–100 mm × ≥100 µm	Indoor / outdoor hazard demarcation	SANS 1418		
10	Scull & Crossbone tape	Polyethylene	Black on Yellow / Red on White	150 mm & 300 mm widths	Hazard / high-risk demarcation	SANS 1418		
11	Shark netting / barrier fencing	UV-stable plastic mesh	Orange	1 m × 50 m roll	Trench / site barricading	SANS 1418		

ITEM 33

Compliance Schedule – Item 33: Electrical Consumables - Fuses

No.	Specification	Requirement	Comply – Yes	Comply – No
General Compliance				
1	Standards	IEC 60282-1 / SANS 60282-1 for MV fuses; IEC / SANS 60269 for LV; SANS 556/171 for HRC		
2	Manufacturer	ISO 9001-certified with test certificates from accredited labs		
3	Warranty	12 months from installation or 18 months from delivery		
MV Drop-Out / Striker-Pin Fuses (11 kV)				
4	Voltage rating	11 kV (Um = 12 kV)		
5	Rated currents	8 A, 10 A, 15 A, 20 A, 25 A, 31.5 A, 40 A, 50 A, 63 A, 80 A, 90 A		

Initials of Service Provider's Authority: .....

6	Fuse type	Drop-out / striker-pin, compatible with standard municipal carriers		
7	Time-current curve	Equivalent to Type K or better		
8	Arc-quenching	Non-hygroscopic silica-sand or equivalent		
9	Outdoor performance	UV-resistant, weatherproof for coastal service		
LV HRC Cartridge Fuses (230/400 V)				
10	Voltage rating	230/400 V AC		
11	Current range	6 A, 10 A, 16 A, 20 A, 25 A, 35 A, 50 A, 63 A, 80 A, 100 A, 125 A, 160 A, 200 A, 250 A, 315 A		
12	Breaking capacity	≥ 80 kA		
13	Fuse type	Cartridge-type (ferrule or blade) compatible with municipal bases (e.g. Bussmann, SIBA, Mersen)		
14	Indoor use	Suitable for kiosks, feeder pillars, DBs		
Flying / Service Fuses (Pole-Mounted)				
15	Rated currents	5 A, 10 A, 15 A, 30 A		
16	Construction	Weatherproof, outdoor pole-mounted design with wing-nut terminals		
17	Replacement	Easy field-replacement without tools		
Quality & Certification				
18	Type-testing	Rated current, breaking capacity, time-current curve, dielectric & mechanical strength		
19	Routine-testing	Conducted before delivery; certificate per batch		
20	Packaging	Protective cartons labelled with manufacturer, rating, batch & date		

ITEM 34

Compliance Schedule – Item 34: Cable Glands & Shrouds

No.	Specification	Requirement	Comply – Yes	Comply – No
General Compliance				
1	Standards	SANS 121 / ISO 1461 (galvanising), SANS 314 / IEC 62444 (cable glands), IEC 60529 (IP), IEC 61238-1 (connectors)		
2	Manufacturer certification	ISO 9001 for manufacturer		
3	Voltage rating	Up to 11 kV		
4	Service conditions	–20 °C to +90 °C, resistant to UV, moisture, oils & mild chemicals, coastal corrosion		
5	Accessories supplied	All glands supplied as complete sets with earth tags, locknuts, washers & compression rings		
6	Marking	Permanent size/type & manufacturer ID		

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7	Packaging	Bagged by size, labelled & bundled in cartons to prevent corrosion/damage		
8	Warranty	12 months from installation or 18 months from delivery		
SWA Brass / Galvanised Steel Glands (Item 34.A)				
9	Sizes	No. 0–7 for cable range 16–300 mm²		
10	Material	Brass or hot-dip galvanised steel, continuous earth continuity for armoured cables		
11	Type testing	Pull-out resistance, impact, sealing (IP 54+), continuity		
PVC Glands – Unarmoured (Item 34.B)				
12	Sizes	No. 1–4 for cable range 16–70 mm²		
13	Material	UV-stabilised, moulded PVC, weather-proof		
14	Testing	Pull-out resistance, impact, sealing (IP 54+)		
Pratley PVC / Flame-Proof (Ex-Type) (Item 34.C)				
15	Sizes	No. 1–4 for cable range 16–70 mm²		
16	Certification	Certified Ex-type to SANS/IEC Ex standards, supplied with seals		
Grip-Type Steel Glands – Outdoor Heavy-Duty (Item 34.D)				
17	Sizes	No. 0–4		
18	Material	Hot-dip galvanised steel with slip-proof grip cone		
19	Application	For heavy-duty outdoor terminations of armoured cables		
Posi-Seal Glands – Weather-Tight (Item 34.E)				
20	Sizes	No. 0–4		
21	Construction	Brass body with rubber compression seal, ingress protection ≥ IP 65		
22	Application	For kiosks, feeder pillars, weather-exposed entries		
Shrouds – Weather-Resistant PVC / Rubber (Item 34.F)				
23	Sizes	No. 0–7 to match all gland sizes (16–300 mm²)		
24	Material	Flexible PVC / rubber, UV & weather-resistant		
Quality Assurance & Certification				
25	Type-testing	To IEC 62444 / SANS 314 for pull-out, impact, sealing, continuity		
26	Routine-testing	Dimensional accuracy, thread fit, material finish		
27	Certification	Type-test & routine-test certificates to accompany each batch		

ITEM 35

Compliance Schedule – Item 35: Cable Entry Protection & Ducting

No.	Requirement	Specification	Comply – Yes	Comply – No
1	Underground ducts – material	HDPE/uPVC heavy-duty		
2	Underground ducts – sizes	110 mm and 160 mm bore		
3	Underground ducts – form	6 m lengths or 50 m HDPE coils		
4	Sleeves for pole/plinth entry	HDPE/uPVC, 1.2–1.5 m length		
5	Sleeve diameters	110 mm for LV, 160 mm for MV		
6	Kicker pipes – material	Hot-dip galvanised steel		

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7	Kicker pipe dimensions	1.2 m length, 90° bend, wall thickness ≥2 mm		
8	Colour coding	Red/orange for electrical service		
9	Marking	Manufacturer, size, class, batch, date		

ITEM 36

Compliance Schedule– Item 36: Safety & Danger Signs (A. Rigid Chromadek Signs)

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Standards	SANS 1186 for safety signs; ISO 9001 for manufacturer		
2	Material	0.6 mm Chromadek steel, corrosion-resistant		
3	MV sign size	270 mm × 120 mm		
4	LV sign size	270 mm × 120 mm		
5	Triangular sign size	290 mm × 290 mm		
6	Printing	UV-resistant, outdoor-grade, ≥10-year durability		
7	Mounting	Pre-drilled fixing holes (4-6 for rectangular, 6 for triangular)		
8	Service conditions	Outdoor, coastal, UV-resistant, high-humidity		
9	Service life	≥10 years without significant fading or corrosion		
10	Packaging	Supplied flat, scratch-protected, moisture-resistant		
11	Labelling	Each sign labelled with size, type, manufacturer		
12	Warranty	≥12 months against premature fading, peeling, corrosion		

Compliance Schedule– Item 36: Safety & Danger Signs (B. Sticker / Vinyl Signs)

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Standards	SANS 1186 for safety signs; ISO 9001 for manufacturer		
2	Material	Outdoor-grade laminated vinyl, UV-stabilised, weather-resistant		
3	MV sticker size	270 mm × 120 mm		
4	LV sticker size	270 mm × 120 mm		
5	Triangular sticker size	290 mm × 290 mm		
6	Printing	UV-resistant, outdoor-grade, ≥10-year durability		
7	Adhesive	High-bond outdoor adhesive backing for smooth mounting		
8	Service conditions	Outdoor, coastal, UV-resistant, high-humidity		
9	Service life	≥10 years without significant fading or peeling		
10	Packaging	Supplied flat, scratch-protected, moisture-resistant		
11	Labelling	Each sign labelled with size, type, manufacturer		
12	Warranty	≥12 months against premature fading, peeling		

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ITEM 37

Compliance Schedule – Item 37: Control & Safety Devices

No.	Item	Specification	Comply – Yes	Comply – No
1	Start / Stop Push-Buttons	Industrial duty, complete with NO/NC contacts, rated ≥230 V AC		
2	Emergency Stop Push-Button	Lockable mushroom-head, twist-release, rated ≥230 V AC		
3	Reset Push-Button	Momentary type for control circuits		
4	Auxiliary Contacts	Snap-on / DIN-rail mounted, compatible with supplied contactors		
5	Indication Lamps	Panel mount, LED type, 24 V AC/DC, Red/Green/Amber as required		
6	Control Fuses	2 A HRC type for control circuits		
7	On-Delay Timers	Adjustable range (e.g. 0.1–10 s / 1–30 s), DIN-rail mount		
8	Star–Delta Timers	Adjustable, for motor starting sequence		
9	Flip-Flop Relays	DIN-rail mount, for alternating duty/standby pumps		
10	Control Relays – 24 V DC	Plug-in / DIN-rail type with socket base		
11	Control Relays – 250 V AC	Plug-in / DIN-rail type with socket base		
12	Motor Relays	AC 24...240 V and DC 24...240 V, for motor control logic		

Compliance Schedule – Item 37: Motor Protection & Power Switching

No.	Item	Specification	Comply – Yes	Comply – No
1	Motor Protection Overload Relay	Adjustable thermal overload, trip class 10/20, ranges: 3.7–5.5 A; 6–15 A; 20–35 A; 40–60 A		
2	Contactors – 1.5 A	IEC / SANS 60947-4-1 compliant, coil 230 V AC		
3	Contactors – 60 A	IEC / SANS 60947-4-1 compliant, coil 230 V AC		
4	Contactors – 100 A	IEC / SANS 60947-4-1 compliant, coil 230 V AC / 400 V AC		

Compliance Schedule – Item 37: Field Sensors & Switches

No.	Item	Specification	Comply – Yes	Comply – No
1	Float Switch – Water	24 V AC and 220 V AC types, suitable for potable water, ≥5 A switching		
2	Float Switch – Sewage	24 V AC and 220 V AC types, grease- and sludge-resistant, ≥5 A switching		
3	Liquid Level Control Relay	For conductive probe or float switch interface, DIN-rail mount		

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4	Pressure Switch	Adjustable set-point, contact rating ≥5 A at 230 V AC		
5	Pressure Sensor	0–10 bar range, output 4–20 mA, supply 24 V DC, panel compatible		
6	Solenoid Valve	Normally closed, rated 230 V AC, brass or stainless-steel body as specified		

Compliance Schedule – Item 37: Consumables: Lubricant Oil Sealant

No.	Item	Specification	Comply – Yes	Comply – No
1	Lubrication Grease	Multi-purpose lithium-based grease, NLGI Grade 2, suitable for electric motor and pump bearings		
2	Gear Oil	Industrial gear oil ISO VG 220 (or equivalent) for enclosed gearboxes		
3	Pump Oil	High-grade mineral-based pump oil ISO VG 68 (or equivalent) for pump lubrication		
4	Sealant Compounds	Industrial anaerobic thread sealant and joint compound suitable for water and wastewater service		
5	Cleaning Solvents	Non-corrosive, non-conductive electrical contact cleaner and general-purpose degreaser		

ITEM 38

Compliance Schedule – Item 38 (A): Battery Tripping Units & Substation DC Batteries (A. Battery Tripping Unit (BTU) Panels)

No.	Specification	Requirement	Comply – Yes	Comply – No
A1	Enclosure type	Metal-enclosed, floor-standing or wall-mounted, IP42 minimum		
A2	Input power	230 V AC ±10%, 50 Hz		
A3	Output DC voltage	24 V DC or 30 V DC (as specified)		
A4	Integrated charger	Float + boost mode, efficiency ≥ 90%, ripple < 2%		
A5	DC distribution	MCB-protected individual outgoing circuits		
A6	Metering	DC voltmeter & ammeter provided		
A7	Alarms	Low-/high-voltage alarms with audio-visual indicators		
A8	LV cut-off relay	Integrated low-voltage DC cut-off relay		
A9	Protection	Over-voltage, short-circuit & reverse-polarity protected		
A10	SCADA integration	Potential-free contacts for alarm/status		
A11	Temperature-compensated charging	Included		
A12	Float-charge design	Continuous operation with ≥ 8 h autonomy at full load		
A13	Enclosure finish	Powder-coated / corrosion-resistant		

Initials of Service Provider's Authority: .....

A14	Standards compliance	IEC 60255, IEC 60335-2-29, SANS 10142, ISO 9001		
A15	Warranty	≥ 2 years		

Compliance Schedule – Item 38 (B): Battery Tripping Units & Substation DC Batteries (B. Stationary Battery Banks – VRLA Lead-Acid)

No.	Specification	Requirement	Comply – Yes	Comply – No
B1	Nominal system voltage	24 V DC		
B2	Rated capacity	40 Ah or 65 Ah (as per BOQ)		
B3	Type	VRLA sealed maintenance-free		
B4	Standard	IEC 60896 compliant		
B5	Float life	≥ 10 years at 25 °C		
B6	Self-discharge	≤ 3% per month at 25 °C		
B7	Supplied with	Acid-resistant rack, inter-cell connectors & insulated covers		
B8	Marking	Polarity & cell identification clearly marked		
B9	Routine testing	Factory-tested & certified		
B10	Warranty	≥ 5 years		

Compliance Schedule – Item 38 (C): Battery Tripping Units & Substation DC Batteries (C. Stationary Battery Banks – Nickel-Cadmium (Ni-Cd)

No.	Specification	Requirement	Comply – Yes	Comply – No
C1	Nominal system voltage	24 V DC		
C2	Rated capacity	40 Ah or 65 Ah (as per BOQ)		
C3	Cell type	Pocket-plate or sintered-plate		
C4	Standard	IEC 60623 / IEC 62259 compliant		
C5	Operating temperature	–20 °C to +50 °C		
C6	Float life	≥ 15 years at 25 °C		
C7	Maintenance interval	≥ 2 years at 25 °C		
C8	Cycle life	≥ 3 000 cycles @ 80% DOD		
C9	Supplied with	Acid-resistant rack, inter-cell connectors & insulated covers		
C10	Routine testing	Factory-tested & certified		
C11	Warranty	≥ 10 years		

Initials of Service Provider's Authority: .....

Compliance Schedule – Item 38 (D): Battery Tripping Units & Substation DC Batteries (D. Stationary Battery Banks – Lithium Iron Phosphate ($LiFePO_4$)

No.	Specification	Requirement	Comply – Yes	Comply – No
D1	Nominal system voltage	24 V DC		
D2	Rated capacity	40 Ah or 65 Ah (as per BOQ)		
D3	Standard	IEC 62619 compliant		
D4	Battery Management System (BMS)	Integrated BMS with protection & monitoring		
D5	Maintenance	Maintenance-free, sealed design		
D6	Cycle life	≥ 3 500 cycles @ 80% DOD		
D7	Supplied with	Mounting rack, inter-cell connectors & insulated covers		
D8	Routine testing	Factory-tested & certified		
D9	Warranty	≥ 5 years		

ITEM 39

Compliance Schedule – Item 39: Smart Electronic Locks for Substations & Kiosks

No.	Specification	Requirement	Comply – Yes	Comply – No
1	Padlock body	Composite / plated or hardened steel, corrosion-resistant outdoor grade		
2	Shackle	≥ 6 mm (composite) or ≥ 11 mm (heavy duty), hardened & tamper-resistant		
3	Cylinder type	Electronic digital core, no battery in lock, IP67+		
4	Key technology	NFC + Bluetooth, encrypted comms, rechargeable		
5	Access control	Programmable rights, time-windowing, remote blacklisting		
6	Audit trail	All key/lock activity logged and retrievable		
7	Sync capability	Portable GSM / USB sync device with encrypted comms		
8	Platform	Secure web-based management, mobile-compatible		
9	Durability	Locks/cylinders rated for −20 °C to +60 °C, outdoor weather-resistance		
10	Standards	Complies with IEC 60529 (IP), IEC 62619 (key safety), ISO 9001 (QA)		

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Item	Detailed specification: SABS, SANS, NRS, IEC (As define in each item specification)	Comply		Detailed description of non- compliance
		YES	NO	
1	MINI-SUBSTATIONS			
2	DISTRIBUTION TRANSFORMERS			
3	RING MAIN UNITS AND SWITCHGEAR			
4	MEDIUM-VOLTAGE (MV) CABLE			
5	LOW-VOLTAGE (LV) CABLE			
6	LINE & EARTH CONDUCTOR			
7	AERIAL BUNDLE CONDUCTOR			
8	CONTROL, AUXILIARY AND INTERNAL WIRING			
9	DISTRIBUTION KIOSKS			
10	NETWORK SWITCH DISCONNECTORS			
11	MEDIUM-VOLTAGE (MV) CIRCUIT BREAKERS			
12	LOW-VOLTAGE (LV) CIRCUIT BREAKERS			
13	MINIATURE CIRCUIT BREAKERS (MCBs) & EARTH-LEAKAGE DEVICES			
14	TERMINATIONS, JOINTS, CLAMPS & CONNECTING DEVICES			
15	CONNECTING DEVICES (LINES)			
16	CONNECTING DEVICES (LV CABLES)			
17	SURGE ARRESTERS & LIGHTNING PROTECTION			
18	11 kV LINE CONSTRUCTION – HARDWARE			
19	11 kV LINE CONSTRUCTION – CONNECTORS			
20	11 kV LINE CONSTRUCTION – PREFORMED			
21	11 KV LINE & CABLE ACCESSORIES			
22	MEDIUM-VOLTAGE (MV) FUSES			
23	LOW-VOLTAGE (LV) FUSES			
24	POLES			
25	STREET AND AREA LIGHTING			
26	ELECTRICITY METERS (BULK)			
27	ELECTRICITY METERS SINGLE PHASE			
28	CURRENT TRANSFORMERS (CTS)			
29	READY BOARDS			
30	ENCLOSURES & BOXES			
31	ELECTRICAL CONSUMABLES – LUGS & FERRULES			
32	ELECTRICAL CONSUMABLES – TAPES & SAFETY MARKING			
33	ELECTRICAL CONSUMABLES - FUSES			
34	CABLE GLANDS & SHROUDS			
35	CABLE ENTRY PROTECTION & DUCTING			
36	SAFETY & DANGER SIGNS			
37	PUMP STATION CONTROL & ELECTRICAL ACCESSORIES			
38	BATTERY TRIPPING UNITS & SUBSTATION DC BATTERIES			
39	SMART ELECTRONIC LOCKS FOR SUBSTATIONS & KIOSKS			

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2.1.2.3 DETAILED SPECIFICATION COMPLIANCY STATEMENT

2.1.2.3.1 PRICING INSTRUCTIONS

1. **General**
   - All prices must be quoted in South African Rand (ZAR) and must be exclusive of VAT.
   - VAT is to be shown separately in the pricing schedule.
   - Prices shall include delivery to the Hessequa Municipality central stores or the specified site, off-loading, and all other associated costs.

2. **Contract Period**
   - The contract period will be three (3) years from the date of commencement as stated in the Letter of Appointment.
   - The Municipality reserves the right to purchase more or less than the estimated quantities indicated in the pricing schedule.

3. **Price Adjustment**
   - Prices shall remain fixed for the first twelve (12) months of the contract.
   - Thereafter, prices may be adjusted once annually in July in line with the Consumer Price Index (CPI) as published by Statistics South Africa.
   - No other escalation, surcharge, or fuel levy adjustments will be accepted.
   - Tenderers must submit a written request for price adjustment supported by the official CPI figure within the first month of the new municipal financial year (July).
   - If no request is submitted in time, the previous year's prices will remain in force for the subsequent year.

4. **Estimated Quantities**
   - Quantities stated in the pricing schedule are approximate annual usage estimates based on historical consumption and projected needs.
   - These quantities are provided solely for tender evaluation and award purposes.
   - The Municipality does not guarantee any minimum order quantities during the contract period.

5. **Award per Item / Category**
   - The tender will be awarded per sub-category.
   - The Municipality reserves the right to award different items or categories to different suppliers based on the outcome of the evaluation.
   - Please note that the tender will be evaluated per sub-category. All pricing must be completed in full within a sub-category in order for the submission to be deemed responsive for that specific category or group.
   - Unit pricing shall be provided per individual item, per metre, or per set, as applicable to the nature of the goods. Where items are supplied in packs (for example, cable ties supplied in packs of 50), the unit price shall reflect the price per individual item within the pack. Tenderers must divide the total pack price by the quantity contained in the pack to determine and indicate the correct unit price.

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6. **Warranty and Compliance**
   - Tenderers must ensure that the prices quoted include the cost of supplying items that meet the required technical standards (SANS, IEC, NRS, etc.) and the applicable warranty obligations as set out in the specifications.
   - Any costs for replacing non-compliant goods or rectifying non-compliance will be for the supplier's account

7. **Delivery Time**
   - Tenderers must state the delivery lead-time for each item in the pricing schedule.
   - Lead-times will be considered during contract management to ensure timely delivery.

8. **Basis of Evaluation**
   - Only items that are compliant as indicated in the Specification Compliancy Statement and supported by required documentation will proceed to pricing evaluation.
   - Evaluation will be based on 80 % price, 10 % locality and 10 % B-BBEE.
   - The evaluation process will also include verification of all arithmetic calculations and unit pricing to ensure accuracy. Arithmetic errors or incorrect unit price calculations may render a tender non-responsive.

Failure to adhere to the above will result in your tender being declared non-responsive.

DECLARATION,

I, THE UNDERSIGNED (NAME) .....
CERTIFY THAT THE INFORMATION FURNISHED ABOVE IS CORRECT. I ACCEPT THAT THE MUNICIPALITY MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

AUTHORISED SIGNATURE: .....

NAME: .....

CAPACITY:.....

DATE: .....

Initials of Service Provider's Authority: .....