

Annexure A



KEETMANSHOOP MUNICIPALITY

KEETMANSHOOP ELECTRICITY BUSINESS UNIT (KEBU)

SPECIFICATION FOR DISTRIBUTION
KIOSKS

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KEBU_SPEC_009

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FOREWORD

This specification covers Keetmanshoop Electricity Business Unit (KEBU) specific requirements for Low Voltage Distribution Panels.

Tenderers shall complete the technical schedules as detailed in Annexure B – Technical Schedules A and B. All deviations from the requirements shall be stated in the tender documentation. In the absence of such a statement, it shall be understood that all requirements of this specification are fulfilled without exception.

Specifications are referenced in the normative references section; the list of standards may be used as a guide, but should not be regarded as a complete list. Tenderers shall be responsible for obtaining copies of NRS documents and any other relevant and current national and international standards.

Distribution Kiosks shall comply with the relevant SANS and/or IEC equivalent standards or similar approved.

1 SCOPE

This specification covers the requirements for outdoor ground-mounted Distribution Kiosks for the provision of single-phase and three-phase low voltage service connections utilizing underground cables.

2 NORMATIVE REFERENCES

Parties using this specification shall apply the most recent edition of the documents listed below.

SANS 121, *Hop-dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods.*

SANS 556-1, *Low-voltage switchgear and controlgear Part 1: Circuit-breakers*

SANS 1186-1, *Symbolic safety signs – Part 1: Standard signs and general requirements*

SANS 1195, *Busbars*

SANS 1433-1, *Electrical terminals and connectors – Part 1: Terminal blocks having screw and screwless terminals*

SANS 1507-2, *Electric cables with extruded solid dielectric insulation for fixed installations (300/500V to 1900/3000V) – Part 2: Wiring Cables*

SANS 1973-3, *Low-voltage switchgear and controlgear ASSEMBLIES – Part 3: Safety of ASSEMBLIES with a rated prospective short-circuit current of up to and including 10 kA*

SANS 10142-1, *The wiring of premises – Part 1: Low voltage installations*

SANS 1091, *National colour standard*

SANS 60529, *Degrees of protection for enclosures (IP code)*

SANS 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code).*

SANS 60947-1, *Low voltage switchgear and controlgear – Part 1: General rules*

SANS 60947-2, *Low voltage switchgear and controlgear – Part 2: Circuit-breakers*

NRS 056, *Service distribution boxes – Meter kiosks and distribution kiosks*

3 DEFINITIONS AND ABBREVIATIONS

3.1 DEFINITIONS

The definitions and abbreviations as given in the normative references shall apply.

3.2 ABBREVIATIONS

IP	Ingress Protection
UV	Ultra violet
MCB	Miniature circuit breaker
MCCB	Moulded case circuit breaker
PMMA	Polymethyl methacrylate (acrylic)

4 REQUIREMENTS

4.1 PARTICULARS OF THE SYSTEM

4.1.1 The kiosks are required for use on a 240 V/420 V $\pm 10\%$, 50 Hz, 3-phase, 4-wire underground cable system, the neutral of which is solidly earthed.

4.2 SERVICE CONDITIONS

4.2.1 The kiosks shall be suitable for continuous operation under the following conditions:

- a) altitude: not exceeding 1500 m;
- b) ambient air temperature: -5 °C to 45 °C;
- c) ultraviolet radiation: high;
- d) relative humidity: 10 % to 95 %;

4.2.2 The kiosks will be exposed to salt-laden atmosphere and the design shall be such as to ensure maximum protection against corrosion.

4.3 DESIGN

4.3.1 The kiosks will be used as points of supply to distribute electricity to customers and will be installed on the ground on sidewalks of residential townships and commercial areas. The completed units shall be compact and shall present an overall neat and attractive appearance.

4.3.2 The kiosks shall be of adequate size to accommodate the number of outgoing consumer circuits as specified in schedule A.

4.3.3 The kiosks shall have two sections, namely:

- a) one section containing all incoming and outgoing switchgear and cables, and
- b) one section containing the consumer meters and circuit breakers.

4.3.4 The kiosks shall comply in all respects with the requirements of the relevant part of NRS 056 except where amended by this specification.

4.3.5 The kiosks shall each comprise a roof, an outer shell and an internal frame supporting an equipment mounting board and the incoming and outgoing cables.

4.3.6 All kiosks shall be fitted with hinged doors. Hinges shall be stainless steel.

4.3.7 The component parts of the kiosks shall be manufactured within close tolerances to permit interchangeability of similar parts.

4.3.8 All roots, internal frames and outer shells shall be interchangeable with kiosks of the same physical size. The outer shell shall fit snugly against the kiosk root.

4.3.9 The kiosks shall have a high standard of finishing. All sharp edges and joints shall be worked off to a smooth finish.

4.3.10 The kiosks shall be rigid and strong and, when installed under normal service conditions, the kiosk shall not deform visibly.

4.3.11 The kiosks shall be delivered in one piece as an assembled unit.

4.3.12 Unless otherwise specified in schedule A, all kiosks shall be pre-wired and installed with equipment items as specified.

4.3.13 The spacing of internal equipment within the kiosks shall be such as not to interfere with the removal of the outer shell.

4.4 MATERIALS

4.4.1 Unless otherwise specified in schedule A, the kiosks shall be manufactured from Linear Low Density Polyethylene using the rotational moulding method.

4.4.2 The kiosks shall be rigidly moulded and shall have a high impact resistance and mechanical strength.

4.4.3 The polyethylene compound used shall be chemically resistant and shall be resistant to deterioration from prolonged contact with soil and/or moisture.

4.4.4 The polyethylene compound shall be fire retardant in accordance with the requirements of NRS 056-1.

4.4.5 The kiosks shall be resistant to abrasion and heat and shall be specifically treated with stabilizing additives to provide enhanced ultraviolet (UV) breakdown resistance. The minimum service life expectancy of the kiosks before UV radiation adversely affects the rigidity, mechanical strength and/or composition of the polyethylene compound shall be stated in the tender documents.

4.4.6 The materials used shall be free from blow holes or any other defects.

4.4.7 The kiosks shall have an internal frame constructed from angle or U-shaped corrosion resistant 3CR12 steel of thickness not less than 2,5 mm to support the equipment mounting panel and cable supports, or alternatively shall have a self supporting polyethylene equipment mounting panel to the approval of Keetmanshoop Municipality.

4.5 PAINTING, COLOURING AND PROTECTION AGAINST CORROSION

4.5.1 All ferrous parts that are not manufactured from 3CR12 shall be hot dip galvanised in accordance with the requirements of SANS 121 or otherwise protected in an approved manner against corrosion. Galvanising shall be carried out only after all welding, drilling and machining has been completed.

4.5.2 All rivets, bolts, nuts, washers and set screws shall be of stainless steel or other approved non-ferrous metal.

4.5.3 The kiosks colouring pigment shall be incorporated in the polyethylene powder prior to moulding.

4.5.4 The colour shall be as specified in schedule A.

4.5.2 Degree of Protection

The degree of protection of the installed kiosk shall be at least IP35 to SANS 60529.

4.5.3 Resistance to Impact

The degree of protection against mechanical impacts shall be at least IK 04 to SANS 62262 and, when tested accordingly, the kiosk shall suffer no damage that may be detrimental to its continued use.

4.6 DOORS AND HINGES

4.6.1 General

4.6.1.1 The doors shall be watertight and vermin proof, and shall maintain the IP rating of the enclosure or compartment when in the closed position.

4.6.1.2 The doors shall be fitted with neoprene, or equivalent to approval, gaskets to ensure a firm and secure seal when in the closed position. Doors shall exert uniform pressure at all points on the gasket when the door is closed.

4.6.1.3 The doors shall be designed and constructed in such a way as to minimise the possibility of vandalism through the insertion of implements between the door and the kiosk shell to lever the locked door open.

4.6.1.4 The front door shall be hinged a minimum of 130° and shall be fitted with means to prevent over swing when opening and a rigid wind stay to secure the door in the open position. The doors, when held in the open position using the wind stay, shall be capable of withstanding the wind load generated by a wind speed not exceeding 34 m/s.

4.6.1.5 Unless otherwise specified, the rear door must not be hinged, but must be removable with moulded pins at the bottom and stainless steel padlock facilities at the top.

4.6.1.6 An A5 size card holder shall be fitted centrally to the inside of the doors of the Kiosks.

4.6.2 Polyethylene Doors

4.6.2.1 Doors on the kiosks shall be manufactured from polyethylene.

4.6.2.2 The doors shall be hung and hinged with stainless steel pins or equivalent to the approval of KEBU. All hinges shall be internal, concealed hinges so as to reduce vulnerability to vandalism. No piano hinges will be accepted.

4.6.2.3 The doors shall be removable on site for ease of installation, maintenance and replacement when necessary.

4.6.2.4 The doors shall have a 40 x 40 mm internal perimeter stiffener as well as a 20 x 3 mm stainless steel support across the lock section to eliminate tampering.

4.6.2.5 Stainless steel standard padlock facilities shall be provided for both doors unless otherwise specified.

4.6.2.6 Alternative locking mechanisms shall be to the approval of KEBU.

4.7 KIOSK ROOTS

4.7.1 The kiosks shall be provided with a root integral with the internal frame.

4.7.2 The roots shall be so constructed and dimensioned that the kiosk shall be held firmly in position by the pressure of the soil bearing on the root. The top of the root shall be designed to protrude at least 100 mm above finished ground level.

4.7.3 The root shall be marked in an approved manner on the front and sides to indicate the ground level when installed.

4.7.4 The roots shall be of minimum depth 350 mm.

4.7.5 The roots shall have an adequate clear opening for cable access.

4.8 EQUIPMENT MOUNTING PANEL

4.8.1 The equipment mounting panels shall be manufactured of blockboard of 19 mm thickness, consisting of laminated battens and veneered on both sides. The blockboard shall be of the water resistant type, trade name "Supadek" or equivalent to approval, and shall be treated with two coats of an approved wood preservative. The equipment mounting panel shall be flame retardant.

4.8.2 Alternatively, equipment mounting panels manufactured from polyethylene will be considered, but shall be to the KEBU's approval.

4.8.3 All equipment to be mounted on blockboard mounting panels shall be mounted with brass screws. The brass screws shall penetrate the mounting panel by at least 15 mm.

4.8.4 All equipment to be mounted on polyethylene mounting panels shall be screwed onto threaded brass inserts installed during the polyethylene panel moulding process.

4.8.5 The equipment mounting panel shall be appropriately sized for the specified equipment to be mounted with a clearance of at least 70 mm between equipment except that, for meters and circuit breakers, the horizontal clearance between equipment may be reduced to a minimum of 20 mm. Deviations from the above clearances shall be to the approval of KEBU.

4.8.6 All miniature circuit breakers (MCBs) and moulded case circuit breakers (MCCBs) shall be positioned on the mounting panel in such a way as to comply fully with the circuit breaker manufacturer's requirements regarding minimum electrical clearances and arc venting clearances to adjacent earthed and live components.

4.8.7 The mounting panel shall be secured to the kiosk frame by means of stainless steel bolts, nuts and washers.

4.8.8 All busbars, terminals and other live parts shall be shielded against accidental contact by an acrylic (PMMA) shield of minimum thickness 3 mm, or by other means to the approval of the Engineer. The PMMA shield shall have warning signage as specified. The PMMA shield shall be removable with the kiosk shell in place and the door in the open position.

4.9 BUSBARS

4.9.1 All kiosks shall be fitted with incoming and separate consumer phase busbars, neutral bars and earth bars, and if applicable shall also be fitted with consumer neutral bars.

4.9.2 The busbars, neutral bars, consumer neutral bars and earth bars shall be tinned high conductivity copper busbars in accordance with SANS 1195.

4.9.3 The busbars shall have an adequate current rating.

4.9.4 The phase and neutral busbars shall be mounted horizontally and shall be arranged in an approved manner to accommodate up to 4-core 185 mm² cables. These cables will be bolted to the busbars by means of lug terminals.

4.9.5 The phase busbars shall be mounted on a stepped busbar holder with a step size and clearances sufficient to ensure that safe electrical clearance is maintained between the cable lugs on incoming distribution cable tails and the busbars of adjacent phases. Safe electrical clearances shall also be provided between the busbars/lugs and other non-current carrying surfaces in the kiosk, including the busbar shroud.

4.9.6 The busbars shall be permanently colour coded in an approved manner to allow identification of the red, white and blue phases and the neutral bar. Red phase shall be situated at the top.

4.9.7 The busbars, neutral bars and earth bars shall be pre-drilled, prior to tinning, in accordance with the requirements as specified for the particular kiosk type.

4.9.8 The busbars, neutral bars and earth bars shall be fitted with close tolerance stainless steel bolts, nuts and washers at all cable connecting points.

4.9.9 The consumer's neutral bar shall be installed below the main neutral bar and on the reverse side of the mounting panel. Stainless steel bolts, nuts and washers shall be supplied and fitted to the neutral bar at all connecting points.

4.9.10 The consumer's neutral bar shall be connected to the main neutral bar by means of a solid 25mm x 3 mm tinned copper bar or 70 mm² black PVC insulated stranded copper conductor, spaced midway along the neutral bar.

4.9.11 The main neutral busbar shall be connected to the earth bar by means of a solid 25 mm x 3 mm tinned copper earth strap or 70 mm² black PVC insulated stranded copper conductor.

4.9.12 The busbars shall be mounted on red, white and blue colour coded stand-off insulators.

4.9.13 The neutral bar and, where applicable, the consumer neutral bar shall be insulated from earth by means of black stand-off insulators.

4.9.14 The busbars and neutral bars shall be permanently fixed to the stand-off insulators and the earth bars to the mounting brackets using torque shear nuts or bolts to prevent removal or theft of these busbars.

4.9.15 The busbars shall be insulated in an approved manner with heat shrink insulation wherever practicable so as to prevent accidental contact.

4.10 CABLE GLAND PLATE

4.10.1 The cables shall be terminated on a removable galvanised gland plate of suitable dimension and strength. The gland plate shall cover the full length of the kiosk.

4.10.2 The gland plate shall be at least 300 mm below the nearest terminal of switchgear allowing sufficient space for bending the cable ends. Sufficient space shall be provided underneath the gland plate to allow for the installation of the cables without removing the gland plate.

4.10.3 The gland plate shall be earthed to the earth bar by means of a 70 mm² stranded copper earth conductor.

4.11 WIRING

4.11.1 The internal wiring in the kiosks shall be done with PVC insulated copper conductors. The wiring shall be done in neat horizontal and vertical columns. Each consumer circuit shall be wired from the phase busbars to the circuit breaker and from the circuit breaker to the meter.

4.11.2 Connections to busbars and terminals shall be done by means of cable lugs crimped in an approved manner to the conductor ends. Connections to the busbars shall be made by means of cadmium plated high tensile steel bolts and nuts with locking washers.

4.11.3 All internal wiring of the kiosks shall comply with the requirements of SANS 10142-1.

4.11.4 A terminal block suitable for the termination of 16 mm² stranded copper conductors shall be provided. Terminals shall be of the screw type and a terminal shall be provided for each service connection cable.

4.12 EARTHING

4.12.1 All non-current carrying metal parts, cable armouring and equipment, including metal kiosk shells, roots and internal frames shall be bonded to the earth bar. Earth bonds shall have a minimum cross-sectional area of 70 mm² copper or equivalent.

4.12.2 The neutral busbar and earth busbar shall be connected in accordance with 4.9.

4.13 ELECTRICAL RATINGS

4.13.1 The complete installed system of busbars, frame, mounting panel and other associated equipment in the kiosks shall be capable of withstanding a fault level of 5 kA for 1s.

4.13.2 The main circuit breakers shall be rated 25 kA.

4.14 LABELS AND DANGER SIGNS

4.14.1 The kiosks shall be supplied with the following labels:

- a) An aluminium label with 40 mm high letters and numeral indicating the kiosk number.
- b) Engraved trafolite labels with 6 mm high numerals under each circuit breaker, meter, and terminal on the terminal block indicating the consumer stand number.

4.14.2 The labels shall have a white background and black letters. The 40 mm labels shall be fixed by means of rivets and the 6 mm high labels shall be inserted in 25 mm wide aluminium label holder mounted at the bottom of the relevant equipment.

4.14.3 All doors shall be fitted with a 150 x 100 mm Danger signs.

5 DRAWINGS AND INFORMATION

The following detailed drawings shall be submitted for approval:

- a) Outline drawing indicating size and general details of the kiosk shell, roof and internal mounting frame;
- b) A layout drawing showing the layout and detail of the busbars and equipment and indicating the distances between equipment and the details of the gland plate. Each side of the equipment mounting panel shall be detailed separately with sections to show all equipment, dimensions and clearances clearly.
- c) Single line diagram indicating the electrical connections between equipment.

6 QUALITY INSPECTIONS

To ensure that the requirements are met as specified in this document, quality inspections and tests shall be done before shipment of the kiosk to KEBU stores. KEBU shall have full access to the manufacturer's works at all reasonable times to inspect the progress of the work and to witness all tests.

ANNEX B – TECHNICAL SCHEDULES A AND B