

Title: **STANDARD FOR ENERGY
METER KIOSKS: LOW-
VOLTAGE MULTIWAY FOR
SMALL POWER USERS (SPU)
UNDERGROUND SUPPLY
NETWORKS**

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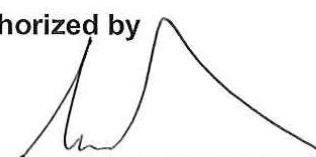


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1. Introduction

This design of the multi-way metering kiosks is similar for the various applications and this document combines the individual specifications of all the options into one document.

The options include:

- Two-, three-, four- and six- way single phase kiosks (BS footprint meters)
- Two-, four-, six-, eight- and twelve-way single phase kiosks (DIN-rail mount meters)
- Two- and four- way three phase kiosk

2. Supporting clauses

2.1 Scope

2.1.1 Purpose

This standard sets out the Distribution Division's requirements for the manufacturing of multi-way single- and three phase, low-voltage meter kiosks for small electrical power users for supplying adjacent customers in an underground network. This kiosk is intended for use in networks where the risk of electricity theft and vandalism is low.

2.1.2 Applicability

This document is applicable to Eskom Distribution Division.

2.2 Normative/informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

- [1] ISO 9001, Quality Management Systems.
- [2] SANS 60947-2, Low-voltage switchgear and control gear Part 2: Circuit-breakers
- [3] SANS 1091, National colour standards for paint
- [4] SANS 1507, Electric cables with extruded solid dielectric insulation for fixed installations (300/500V to 1900/3000V).
- [5] SANS 1574-3, Electric flexible cables with solid extruded dielectric insulation Part 3: PVC-insulated cables for industrial use
- [6] SANS 1186-1, Symbolic safety signs Part 1: Standard signs and general requirements
- [7] SANS 60529, Degrees of protection for enclosures (IP code)
- [8] SANS 60947-7-1, Low-voltage switchgear and control gear Part 7: Ancillary equipment Section 1: Terminal blocks for copper conductors
- [9] SANS 556: 2004, Low-voltage switchgear and control gear Part 1: Circuit-breakers
- [10] SANS 1195: Busbars.
- [11] SANS 61643-1: Surge protective devices connected to low-voltage power distribution systems Part 1: Performance requirements and testing methods
- [12] 240-76628631 (old DSP 34-749), Standard for sealing metering equipment.
- [13] 240-76628289 (old DSP 34-1068 & DSP 34-866), Specification for single and three phase energy meters: Whole current.

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- [14] 240-52840736 (old DSP_34-869 and TSP 41-395), Specification for three-phase programmable energy meters
- [15] Eskom's Technical bulletin 240-98195962 - chemical treatment of 3CR12 kiosks.
- [16] Eskom drawing D-DT-1011, Eskom manufacturing drawings: Two way SPU single-phase meter kiosk manufacturing details.
- [17] Eskom drawing D-DT-1019, Eskom manufacturing drawings: Four way SPU single-phase meter kiosk manufacturing details.
- [18] Eskom drawing D-DT-1020, Eskom manufacturing drawings: Six way SPU single-phase meter kiosk manufacturing details.
- [19] Eskom drawing D-DT-1012, Eskom manufacturing drawings: Two way SPU three-phase meter kiosk manufacturing details.
- [20] Eskom drawing D-DT-1018, Eskom manufacturing drawings: Four way SPU three-phase meter kiosk manufacturing details.
- [21] Eskom drawing D-DT-1035, Eskom manufacturing drawings: Two way SPU single-phase DIN-rail mount meter kiosk manufacturing details.
- [22] Eskom drawing D-DT-1036, Eskom manufacturing drawings: Four way SPU single-phase DIN-rail mount meter kiosk manufacturing details.
- [23] Eskom drawing D-DT-1037, Eskom manufacturing drawings: Six way SPU single-phase DIN-rail mount meter kiosk manufacturing details.
- [24] Eskom drawing D-DT-1038, Eskom manufacturing drawings: Eight way SPU single-phase DIN-rail mount meter kiosk manufacturing details.
- [25] Eskom drawing D-DT-1039, Eskom manufacturing drawings: Twelve way SPU single-phase DIN-rail mount meter kiosk manufacturing details.

2.2.2 Informative

- [26] DIN 17441, Stainless steel: technical delivery conditions for cold rolled strip and slit strip and for plate and sheet cut there from
- [27] SANS474/NRS057 Code of practice for electricity metering

2.3 Definitions

2.3.1 General

Definition	Description
Metering Equipment	A collection of components in the metering installation, namely the instrument transformers, cables, meters, and any housing and ancillary equipment such as test blocks.
Metering Installation	All meters, fittings, equipment, wiring and installations used for measuring the flow of electrical power.

2.3.2 Disclosure classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.4 Abbreviations

Abbreviation	Description
3CR12	Low grade ferritic stainless steel
IP	Ingress Protection
MCB	Miniature Circuit-breaker
MCCB	Moulded Case Circuit-breaker
n/a	not applicable
PTM&C	Protection, Telecoms, Metering and Control
UV	Ultra Violet

2.5 Roles and responsibilities

The relevant metering design sections within Eskom Distribution are responsible to implement the new designs according to the requirements as listed in this document.

2.6 Process for monitoring

Adherence to this document shall be monitored through routine inspections.

2.7 Related/supporting documents

This document supersedes DSP 34-1052 – Specification for multi-way metering kiosks.

3. Requirements

3.1 Meter kiosk construction

The kiosks shall be manufactured from 1.5 mm 3CR12 steel except for the gland plate and base of the kiosk which shall be of 2mm 3CR12. The completed kiosk shall have an IP rating of 3 for protection against touching live parts and it shall have an IP rating of 3 for protection against ingress of liquids. (IP33)

The kiosk can be ground mounted with the use of a kiosk base or can be built into a wall provided that access is available for front and back.

A rubber seal shall be fitted around the entire inside perimeter of the door sills to ensure sealing of the doors to the kiosk.

3.1.1 Box

The sides shall have vermin proof louvres with an effective width of 150mm and an effective height of 100mm at the top and bottom as shown in the relevant drawings. The width of the opening in the louvres shall be between 2mm and 5mm. A stainless steel mesh with openings of not more than 2mm shall be spot welded onto the back of the louver.

3.1.1.1 Door surround

The door surrounds for the kiosk shall incorporate a splash proof sill around the inner border of the door opening of the kiosk.

3.1.1.2 Bottom of enclosure (Gland plate)

The gland plate shall form part of the box and shall not be a separate item. All the holes in the bottom of the enclosure for cable entries shall be fitted with square knockouts which cover the hole. The knockouts shall be spot welded onto the gland plate on one corner of the square.

An area surrounding the holes shall not be powder coated as indicated in the drawings to allow for proper earthing of the cables through the glands.

Holes with knock-outs shall also be provided for the fitment of the kiosk to a kiosk base as indicated in the reference drawings.

3.1.1.3 Earthing details

An earth stud shall be provided as indicated in the drawings. The earth stud shall be an M10 35mm stainless steel set screw (welded onto the bottom plate) and bolt and nut.

All metal components of the panel, doors and devices shall be effectively connected to this earth stud by green 2.5mm² PVC insulated earthing conductors. All earth connections shall be as short as possible and shall not be coiled.

3.1.2 Inner plate

An inner plate shall be used to fit the electrical equipment of the kiosk. The inner plate shall be manufactured from 1,5mm 3CR12 steel and shall be powder coated in a white colour. All the holes shall be drilled by the manufacturer as shown in the reference drawings.

The plate shall have a 10mm lip bent at 90° to the plate, on the top and bottom sides.

Holes for the mounting of the meters shall be provided by the manufacturer as indicated in the drawings. These holes shall be fitted with stainless steel or brass self-clinching nuts or rivet nuts with a M4 or M5 thread size.

The DIN-rails shall be fitted onto the inner plate using stainless steel bolts, nuts and spring washers or screws and spring washers or rivets as shown in the drawing. The DIN-rail may also be spot welded onto the back of the panel.

The inner plate shall be fitted onto the box by means of four stainless steel set screws, nuts and spring washers.

3.1.2.1 Busbars

Busbars shall be fitted onto the back of the kiosk for the red, white, blue and neutral phases as indicated in the reference drawings. The busbars shall be of 40 x 10mm tinned copper.

The busbars shall be supported by 40mm long and 40mm diameter insulators. The insulators shall have a cylindrical shape (without sheds). The insulators shall have M10 inserts on either end. The minimum diameter of the flat circular surface where the insulator makes contact with the frame and busbar shall be 25mm. The insulators shall be coloured to indicate the phase of each busbar. From left to right the phase order of the busbars shall be red, white, blue and neutral.

The busbars shall come fitted with stainless steel 35mm M10 and M12 set screws, nuts and spring washers.

3.1.3 Door

The doors shall be fitted with stainless steel hinges at the top and bottom of the left side of the doors.

The front door shall have UV resistant, impact resistant windows as shown in the reference drawings.

The windows shall be fastened onto the door by stainless steel rivets and sealed by silicon sealer.

A sturdy door stay shall be provided on the doors to ensure that the door can be kept in a 90 ° open position. The door stays shall be manufactured from a non-ferrous metal.

Stainless steel three-way lever locks suitable for a padlock with an 8mm diameter shackle shall be fitted horizontally on the right. The holes in the lever lock shall have a minimum diameter of 12mm. A protective box which is open on the bottom shall be fitted over the lever lock.

3.1.4 Base

Two options for the base are provided for as shown in the reference drawings. The base shall be manufactured from 2mm 3CR12 steel.

The kiosk shall be supplied as standard with the tapered base. If the other base is required then it must be specifically stated in the order.

Four M10 30mm stainless steel set screws, nuts and spring washers shall be provided to secure the kiosk onto the base as indicated by the relevant drawings. 13mm diameter holes shall be drilled or punched in the base and the nuts shall then be welded inside the base centred over the holes to allow the bolts to be screwed from the outside into the nuts.

Two inspection covers shall be fitted onto the front and back of the base and each shall be secured onto the base by six stainless steel set screws and nuts. The nuts shall be welded onto the inside of the base.

Six M8 20mm stainless steel set screws, nuts and spring washers for each of the cover plates shall be provided to secure the plates onto the base. 12mm diameter holes shall be drilled or punched in the base and the nuts shall then be welded inside the base centred over the holes to allow the bolts to be screwed from the outside into the nuts.

3.1.5 Set screws, nuts and spring washers

All set screws, nuts and spring washers used for the fitment of different parts or equipment in the kiosk shall be of stainless steel. All set screws and nuts shall be fitted with spring washers.

3.2 Fabrication of 3CR12 steel kiosks

All cutting, forming, forging, machining, welding, fastening, annealing, stress relieving, post weld cleaning and coating shall comply with the internal standards of the manufacturer of 3CR12 steel.

3.2.1 Cutting

In all cutting operations, whether thermal or mechanical, carried out on 3CR12 steel, no contamination by ferrous (iron or steel) material or particles shall take place. Sharp or rough edges shall be removed by manual grinding or filing.

3.2.2 Bending

It is important to ensure that there is no contamination of the 3CR12 steel from mild steel particles adhering to the tooling. It is recommended that the tooling be thoroughly cleaned before running 3CR12 steel.

3.2.3 Welding

For Manual Metal Arc (MMA) welding type 309L electrodes are recommended for welding 3CR12 steel, although E308L and E316L may also be used.

For Tungsten Inert Gas (TIG), Metal Inert Gas (MIG) and Plasma arc welding (PAW) the recommended welding consumables are AWS A5.9 ER309L, ER308L or ER316L.

When welding stainless steel studs, bolts or nuts onto 3CR12 steel it is recommended that the weld consumable shall be the AWS class 309L to avoid excessive weld metal dilution.

Where the manufacturer is using stud welding onto 3CR12 steel then 304L stainless steel studs shall be used.

Spot welding (resistance welding) shall only be used on parts of the kiosk that are not directly in contact with the outside atmosphere.

3.2.4 Post weld cleaning (pickling and passivation)

Post weld cleaning, pickling and passivation shall be done according to Technical bulletin 240-98195962 - chemical treatment of 3CR12 kiosks.

3.2.5 Powder coating

Before powder coating can take place it is very important to ensure that there is no oil present on the kiosk. The kiosk shall be degreased before powder coating.

The inner plate shall be powder coated with white epoxy-polyester powder (SANS colour code 69-0135) to ensure a coating thickness of between 60µm and 80µm.

The kiosk (box, roof and/or base) shall be powder coated with light navy grey polyester powder (SABS colour code G35) and the thickness shall be between 60µm and 80µm.

3.3 Meter kiosk electrical equipment

All equipment used within the kiosk (meters, circuit breakers and terminals) shall be touch safe i.e. have enclosed terminals, recessed screws etc. They shall comply with clause 8.2 of IEC 60898, which states all the requirements for equipment to be touch safe.

Where equipment is used that does not allow for the touch safe requirement, then they shall be protected by means of suitable covers.

Any live part of the equipment shall have at least 20mm of clearance from metal parts that is connected to earth.

3.3.1 Wiring

The kiosk shall be wired in accordance with the reference drawings. All wiring shall be done in stranded copper PVC insulated conductor which shall comply with SANS 1507 and SANS 1411.

The supply cables shall be connected onto the busbars at the back of the inner plate. The customer's cable shall be connected onto the terminals.

The wiring between busbars and MCBs, MCBs to meters and meters to the terminals shall be colour coded 25mm² cables.

The neutral from Eskom's side will be hard-wired, by way of the bridge bar on the neutral and earth terminals, onto the earth stud inside the kiosk. The earth wire from the earth terminal to earth stud shall be a 16 mm² green and yellow wire.

There shall be no joints or splices in the wiring.

No bare wiring shall be exposed at termination points on the meter, the circuit-breaker and the terminals.

Wiring into the meter terminals shall be long enough to be fastened by both terminal screws.

No individual wire numbering is required.

3.3.2 Circuit breakers

Miniature circuit-breakers (MCB) shall comply with SANS 556 and IEC 60898. Their operating mechanism shall be hydraulic-magnetic.

The circuit-breakers shall have a curve 1 tripping curve and the rupturing capacity of the circuit-breaker shall not be less than 5kA. These miniature circuit-breakers shall be DIN-rail mounted.

Terminals of MCBs which are not touch safe shall be protected by suitable terminal covers.

Only Eskom accepted MCBs circuit-breakers shall be used as specified in the Eskom List of Accepted products.

3.3.3 Surge arrestors

Surge arrestors shall be installed onto all the phase conductors as indicated in the drawings. The surge arrester shall be the metal oxide, DIN rail mount type with indication suitable for Zone 1 protection. The arrester shall comply with SANS 61643- 1 and bear the SANS mark.

The technical specification for the surge arresters shall be:

I _{max} (8/20 μ s)	40kA or 65kA (4/20 μ s)
Response time	<25ns
Max. operating voltage	275V AC (phase-to-neutral) 360V DC
Frequency	50Hz
Internal fuse	Yes
Open-circuit	Open-circuit on expiry of the device
Indication	Clear change-of-state (functional or non-functional) indication

3.3.4 Meter

The kWh (active energy) conventional meters shall be supplied by the manufacturer of the kiosk. It shall be an accepted Eskom meter as specified in the Eskom List of Accepted products.

The meters shall be calibrated units (at a SANAS approved calibration facility), shall have a "Tested" sticker applied to the front plate and sealed on the front cover and terminal cover in accordance with 240-76628631 (old DSP 34-749), *Standard for sealing metering equipment*.

The meters for the DIN-rail mount kiosks shall not be supplied by the manufacturer of the kiosk.

3.3.5 Terminals

The terminals shall be approved units as listed on the drawings. The terminals shall be arranged according to the respective drawings.

3.4 Notices, labeling and packaging

3.4.1 Notices

Notices shall be provided as required by the Occupational Health and Safety Act. All notices shall be fastened to the kiosks by self-tapping stainless steel screws or by rivets.

A standard "Danger" notice in accordance with SANS 1186 shall be provided and placed on the front and back of the kiosk.

3.4.2 Labels

A label showing the name of the manufacturer, the date of manufacture and the various quality checks shall be placed on the inside of the kiosk door. The label shall be durable preferably of metal.

3.4.3 Packaging

Each kiosk shall be wrapped in bubble wrapping or cardboard before shipping to Eskom stores. This covering shall protect the kiosk and its components from reasonable transport related wear and tear from the supplier's works to the end customer. The cabinet shall be clearly labelled as follows:

- Full delivery address
- Detailed content description as stated on the order

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- Dispatch date
- Eskom and supplier order number

Note: (Label shall also be placed inside the cabinet. This helps when the packaging is damaged.)

3.4.3.1 Kiosk identification

The kiosks shall be marked according to the size of the kiosk with a permanent black marker (pen) on the outside, top, left side of the door (front door). A stencil that represents an Arial font size 72 (± 18 -25mm high) shall be used. A two-way single phase kiosk shall thus have the mark "2-way 1ph" on the door.

A barcode label indicating the size of the kiosk and the Eskom SAP number shall be placed on the inside of the kiosk door and on the outside of the packaging material of the kiosk.

The kiosk shall also have a unique number as specified in Eskom's Technical instruction: 08 TI – 010: Meter kiosk numbering.

3.5 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 Eskom stores.

Details of the manufacturer inspection label are shown in table B1 in annex B.

4. Authorization

This document has been seen and accepted by:

Name and surname	Designation
S Mkhabela	Senior Manager: Distribution

5. Revisions

Date	Rev.	Compiled by	Clause	Remarks
Feb 2017	2	HPD Groenewald		Added the DIN-rail mount meter kiosk options
			3.2.4	Post manufacturing chemical treatment shall be done according to Technical bulletin 240-98195962
			3.3.3	Added requirements for surge arrestors
			3.3.4	DIN-rail meters shall not be supplied with the kiosks
March 2015	1	HPD Groenewald		New document number for document
			3.1.1.3	Earthing stud changed to a M10 35mm set screw. Earthing required between door and panel.
			3.1.3	Protective box added over lever lock.
			3.3.1	Wiring into the meter terminals shall be long enough to be fastened by both terminal screws.
Oct 2010	1	HPD Groenewald	3.4.3	Added details on packaging.
				Development team expanded.
			3.1	Added rubber seal
			3.1.3	Removed barrel bolt as standard with kiosks
			3.1.3	Windows to be sealed by silicon sealer

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Date	Rev.	Compiled by	Clause	Remarks
Oct 2007	0	HPD Groenewald	-	Keywords added
			-	Normative references changed to reflect new document numbering.
			-	All references to individual options have been removed and replaced by general references to SPU kiosks.
			3.1.4	Added requirement for rivet nuts to be fitted to meter holes on inner plate
			3.1.5.2	Kiosk base thickness reduced from 3mm to 2mm.
				<p>This revision combines, cancels and replaces the following specification documents:</p> <ul style="list-style-type: none"> • DISSCABE1 revision 3 (single phase two way metering kiosk) • DISSCABS5 revision 1 (single phase four way metering kiosk) • DISSCABS6 revision 1 (single phase six way metering kiosk) • DISSCABE0 revision 2 (three phase two way metering kiosk) • DISSCABM4 revision 2 (three phase four way metering kiosk) • DISSCABT9 revision 0 (single phase fifteen way metering kiosk)

6. Development team

The following people were involved in the development of this document:

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- Johan le Roux Group Technology PTM
- Braam Wahl PTM

7. Acknowledgements

Not applicable.

Annex A – List of drawings

The following drawing forms part of this annex:

- 1) D-DT-1011, Eskom manufacturing drawings: Two way SPU single-phase meter kiosk manufacturing details.
- 2) D-DT-1019, Eskom manufacturing drawings: Four way SPU single-phase meter kiosk manufacturing details.
- 3) D-DT-1020, Eskom manufacturing drawings: Six way SPU single-phase meter kiosk manufacturing details.
- 4) D-DT-1012, Eskom manufacturing drawings: Two way SPU three-phase meter kiosk manufacturing details.
- 5) D-DT-1018, Eskom manufacturing drawings: Four way SPU three-phase meter kiosk manufacturing details.
- 6) D-DT-1035, Eskom manufacturing drawings: Two way SPU single-phase DIN-rail mount meter kiosk manufacturing details.
- 7) D-DT-1036, Eskom manufacturing drawings: Four way SPU single-phase DIN-rail mount meter kiosk manufacturing details.
- 8) D-DT-1037, Eskom manufacturing drawings: Six way SPU single-phase DIN-rail mount meter kiosk manufacturing details.
- 9) D-DT-1038, Eskom manufacturing drawings: Eight way SPU single-phase DIN-rail mount meter kiosk manufacturing details.
- 10) D-DT-1039, Eskom manufacturing drawings: Twelve way SPU single-phase DIN-rail mount meter kiosk manufacturing details.

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Annex B – - Manufacturer inspection label

Table B.1

Name of manufacturer:	
Date of manufacture:	
Order number:	
Name of manufacturer's quality inspector:	
Correct meters installed?	
Correct MCBs installed?	
Correct conductors installed?	
Correct terminals installed?	
Correct labels installed?	
Wiring checked?	
Tightness checks done on wiring?	
Powder coating checked?	