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Title: **SPECIFICATION FOR STANDARD (19 INCH) EQUIPMENT CABINETS**

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Content

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1. Introduction

This document together with the technical drawings and other reference material, serves as a specification for standard and/or swing frame cabinets and blanking plates constructed from mild steel. The product serves as a cabinet for secondary plant control equipment mounting of miscellaneous 19" rack-mounted equipment inside a substation control room.

This specification defines the purchaser's requirements for the following equipment

a) 2.4 meter 19'' rack-mounted standard equipment cabinet – Type A (48U)

b) 2.2 meter 19'' rack-mounted standard equipment cabinet – Type B (43U)

c) 1.85 meter 19'' rack-mounted standard equipment cabinet – Type C (38U)

d) 2.4 meter swing frame equipment cabinet

e) 2.4 meter internal swing frame equipment cabinet

f) 2.4 meter gateway internal swing frame equipment cabinet

g) 2.4 meter Automation equipment cabinet

h) 2.4 meter metering equipment cabinet

i) 2.4 meter protection fixed frame equipment cabinet

j) 2.4 meter Buszone protection swing frame equipment cabinet

k) Circuit breaker panel

l) AC supply module

2. Supporting clauses

2.1 Scope

This specification details Eskom's technical requirements for the design and manufacture of standard equipment cabinets. The standard equipment cabinets are for use in Eskom Substations, for the mounting of miscellaneous 19" rack-mounted equipment.

2.1.1 Purpose

This specification provides potential suppliers with a framework against which their offered products will be adjudicated. Further, this specification shall be the technical basis for any supply contract to be awarded. Technical A/B schedules are required to be completed by all suppliers

2.1.2 Applicability

This document shall apply throughout Eskom Transmission and Distribution secondary plant equipment.

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] SANS 60529 Degrees of protection provided by enclosures (IP Code)

[2] IEC 60297 Dimensions of mechanical structures of the 482,6mm (19 in) series

[3] ANSI/ESD S1.1 ESD Association standard for the protection of electrostatic discharge susceptible items – Wrist Straps

[4] ANSI/ESD S6.1 ESD Association standard for the protection of electrostatic discharge susceptible items – Grounding

[5] SANS 121 ISO1461 Hot dip galvanised coatings on fabricated iron and steel articles – Specifications and test methods

[6] SANS ISO 2081 Electroplated coatings of zinc with supplementary treatments on iron or steel

[7] SANS ISO 2082 Electroplated coatings of cadmium with supplementary treatments on iron or steel

[8] SANS 164 Plug and socket-outlet systems for households and similar purposes for use in South Africa, Parts 0 and 1

[9] SANS 1091 National Colour Standard

[10] QM-58: Supplier Contract Quality Requirements Specification

[11] 240-75655504: Corrosion protection standard for new indoor and outdoor Eskom equipment, components, materials and structures manufactured from steel

[12] 240-53207174: Risk and governance practice note

[13] 240-62629353: Specification for panel labelling

[14] 240-64100247: Standard for earthing of secondary plant equipment in substations

[15] DPC 32-1034: Eskom Procurement and Supply Management Procedure

2.2.2 Informative

[16] ISO 9001, Quality Management Systems.

[17] 32-644: Eskom documentation management standard

2.3 Definitions

2.3.1 General

Definition	Description
19 inch rack	Is a standardized frame or enclosure for mounting multiple equipment modules. Each module has a front panel that is 19 inches (482.6 mm) wide, including edges or ears that protrude on each side which allow the module to be fastened to the rack frame with screws.
1U	A unit of vertical measurement as per IEC 60297-1 equivalent to 44,45mm
Data sheets	All drawings, tabulations, sketches, and relevant documentation which Eskom shall submit with an enquiry, to clearly indicate to a bidder or supplier the technical, electrical and physical requirements of the completed equipment.
Passivated	Passivating is the use of a light coat of material such as metal oxide to create a shell against corrosion. Passivation is useful in strengthening and preserving the appearance of metallics.
The purchaser	Eskom Holdings Limited
The supplier	A successful tenderer, with whom a supply contract is placed. In other words, all tenderers are potential suppliers
Vertical member	Structural part of a rack/cabinet providing mounting holes for front panels, chassis and sub-racks

2.3.2 Disclosure classification

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

2.4 Abbreviations

Abbreviation	Description
AC	Alternating Current
ENC	Eskom National Contract
ESD	Electrostatic Discharge
FAT	Factory Acceptance Test
GA	General Arrangement
IEC	International Electrotechnical Commission
IP	Ingress Protection
ISO	International Organisation for Standardisation
SANS	South African National Standards

2.5 Roles and responsibilities

The *supplier* is to take cognisance of the following with regards to the tender returnables and the technical A/B schedules:

a) General and Specific Technical schedule A: The Purchaser's Requirements.

b) General and Specific Technical schedule B: Guarantees and Technical Particulars (to be completed by supplier).

2.6 Process for monitoring

N/A

2.7 Related/supporting documents

This revision cancels and replaces revision no. 1 of document no. DSP 34-464.

3. Requirements

3.1 Swing frame cabinets

3.1.1 General

a) Detailed requirements for a swing frame panels are indicated in D–DT–5400 and 0.52/30616 sheets 1 to 6. This specification makes reference to "Item" numbers from the drawings. Item numbers are indicated on D–DT–5400 sheet 1 as a number enclosed in a circle.

b) All dimensions shall be strictly adhered to; should any changes become necessary, this shall be done with the written approval of the appropriate Eskom technical specialist.

c) The complete cabinet with the door closed and blanking plates fitted shall have an IP rating of IP40.

3.1.2 Cabinet body

a) Refer to Item 2 on D–DT–5400 and 0.52/30616 Sheet 1.

b) The cabinet body shall be constructed from mild steel with a thickness of 2 mm.

c) Two strips of 100mm x 100mm trunking shall be fitted to the back plate mounting brackets as shown on D–DT–5400 and 0.52/30616 sheet 1 (Item 6). The trunking shall be mounted in a symmetrical manner such that it is equidistant from the top and bottom of the panel.

d) The cabinet shall have 4 x M12 eyebolts on each corner of the cabinet at the top. The eyebolts serve to lift the cabinet, inclusive of schemes and other ancillary equipment, and shall allow for the lifting of the weight of the cabinet plus an additional 360kg.

e) The loose rear plate (Item 5 on D–DT–5400 sheet 1) shall have chamfered edges with rounded corners.

f) Each side wall shall include a cut-out window to be used for bus wiring. The dimensions and position of the window shall be as indicated on D–DT–5400 and 0.52/30616 sheets 1 and 4. Each window shall be covered with a removable rectangular plate, secured to the inside of the panel using a cage nut and screw. The bolt shall not protrude onto the outside of the panel.

g) Each separate plate or loose steel construction that is bolted together shall be bonded to the 3mm x 40mm copper earthing straps that are provided on the gland plates. Unless indicated to the contrary, bonding shall be achieved by way of 12mm^2 tin-plated copper earthing braid. The continuity between any part of the cabinet and the earthing straps shall be 0.1 ohms or less. The sheet metal and other fixtures that are bolted together shall be done, where possible, by welded studs and bolts.

h) Earthing studs fitted with a spring or a serrated washer, plain washer and the fastening nut shall be provided at the following locations:

- At the inside top and bottom of the rear plate; and
- On each buswire aperture cover.

i) The rear plate shall be bonded to the top and bottom earthing straps. The buswire aperture covers shall be bonded to one of the earthing straps using green PVC insulated 1000VAC multi strand 2.5mm^2 copper wire.

j) The buszone cabinet body shall include 22.5mm diameter holes situated next to the aluminium label holder as indicated in 0.52/30616 Sheet 1A. these holes are to accommodate lamps for the panel not healthy indication. These holes shall be blanked off with the suitable blanking plugs.

3.1.3 Cabinet door

a) Refer to Item 13 on D–DT–5400 Sheet 1 and 0.52/30616 Sheet 1. The door swing frame shall have an aperture of 48U and conform to the requirements of IEC 60297-1. The aperture shall be 488mm wide from edge to edge to allow for the tolerances on the 19 inch schemes and blanking plates to be fitted.

b) The door swing frame shall be constructed from mild steel with a thickness of 2.5 mm.

c) J-shaped vertical buttresses shall be provided at the rear of the aperture. The buttresses shall protrude into the aperture on each side, and shall be punched with the rectangular 19 inch rack attachment holes. The overall effect of this is that 19 inch modules and/or blanking plates will be flush mounted with the front of the panel when installed. In certain applications, 80mm wide trunking may be affixed to the buttressing at the rear of the door.

d) It is preferred, for the sake of clarity, that the door swing frame dimensions be copied from a physical example.

e) The cabinet door shall be fitted with a door swing frame stop as per D–DT–5400 sheet 1 (Item 14) and sheet 5 so as to prevent excessive opening and resultant damage to the paint. The door stop shall include a rubber stopper so as to prevent it from damaging the paint.

f) The door swing frame shall rest on sturdy pivots so as to support the full weight of the door swing frame plus 250kg. The pivot shall be designed in a manner that facilitates easy removal of the door swing frame. The pivots are to be locked in place by lock nuts. The pivots shall under no circumstances be loosened by frequent opening and closing of a heavily loaded door swing frame. The pivots shall protrude through the door swing frame sheet metal by at least 5mm with both pivots completely tightened. The door swing frame shall swing freely when fully loaded, without showing signs of sagging.

g) The door swing frame shall be provided with two cabinet locks for the purpose of securing the door swing frame when closed, and for locking the cabinet. The locks shall be of the lever type.

h) The door swing frame shall have an earthing stud fitted on the bottom rear, right hand side, i.e. close to the door pivot, internal to the cabinet. The stud shall be fitted with a spring or a serrated washer, plain washer and the fastening nut.

i) The door swing frame shall be bonded to the earthing strap on the bottom gland plate by way of a 12mm^2 tin-plated copper earthing braid.

j) Refer to section 3.2.2. for rear door of the buszone protection swing frame cabinet.

3.1.4 Cabinet back plate mounting rails

These shall be to the 19 inch rack standard as per IEC 60297-1 and as indicated in the drawings, and shall carry at least 110kg.

3.1.5 Gland plates

a) The cabinet shall be fitted with blue passivated mild steel gland plates as detailed in the drawings. The forward-most plates shall include earthing straps, whilst the rear plates shall include pre-punched cut-outs for cable termination. It shall be possible for the front and rear plates to be interchanged. The earthing plate that is installed at the top of the panel shall have extruded air vents with a mesh on the underside to prevent ingress of insects.

b) Gland plates shall have a thickness of 2 mm.

c) The earth straps are tin plated 40 mm x 3 mm copper bars, and are to be fitted to both top and bottom gland plates.

d) The gland plate cable entry cut-outs shall be applied on the gland plates at the top and bottom of the panel and shall be sealed off with metal press cut outs.

e) The top and bottom gland plates are to be of equal dimensions and fully interchangeable. The arrangements and dimensions of the cut-outs are as indicated on D–DT–5400 Sheet 2 and 0.52/30616 Sheet 2.

f) The gland plates shall have rounded edges and no sharp corners in order to safeguard installation staff from cuts and abrasions. The requirement of ensuring that sharp edges are removed shall apply to all cabinet parts such as earthing bars, brackets etc., be they internal or external to the cabinet.

3.1.6 Optional accessories

a) On request, an option will be provided whereby the cabinet is fitted and supplied with a plinth-mounting angle iron capable of supporting 350kg. The plinth-mounting angle iron is used to support the chequer plate covering the trench at the back of the cabinet. This is common in older Transmission and Distribution substations. M10 bolts shall be used to fix the angle iron as indicated on D–DT–5400 and 0.52/30616 sheets 1 and 6.

b) An additional option for the supply of two cabinet mounting support brackets as indicated on D-DT-5400 and 0.52/30616 sheet 6 may be requested. These brackets are to be used in cable trench applications to prevent the cabinet from toppling forward if the door is opened with a heavy scheme fitted to the door. One bracket will be fitted to each rear bottom corner of the cabinet.

3.1.7 Blanking plates

a) Blanking plates shall be manufactured from mild steel of 2 mm thickness.

b) Each blanking plate shall be 482.6mm from edge to edge.

c) The mounting holes shall be slotted and shall be 10.30 mm wide and 6.80 mm high. The horizontal distance between the hole centres shall be 465.10 mm. The spacing and size of the holes, similar to all other dimensions and tolerances, shall conform to the latest version of the IEC 60297-1 specification and shall be for the closed hole/slot type. The IEC specification is the only source for manufacturing dimensions.

d) The bends at the edges shall be done in such a way that the gap between butting plates is minimised. Special care must be taken on the portion that overlaps the door mounting edges with a view to producing a cabinet fitted with blanking plates with an overall aesthetically pleasing appearance.

e) Each blanking plate shall have an earthing stud fitted on the rear right hand side, i.e. closest to the door hinge, internal to the cabinet. The stud shall be fitted with a spring or a serrated washer, plain washer and the fastening nut.

f) When supplied pre-fitted into a cabinet, all blanking plates shall be bonded to the door earthing stud by means of green PVC insulated 1000VAC multi strand 2.5mm^2 copper wire.

3.1.8 Cage nuts

Cage nuts and screws shall be as per supplied sample or similar standard-type caged nut with spring clip bolt and plastic washer for the screw. If the cage nut to be used is different from the sample, approval must be obtained from the Eskom technical representative.

3.2 Fixed frame cabinets

3.2.1 Cabinet body

a) Refer to drawings 0.53/1833 (sheets 0 & 1), 0.52/30614 (sheets 1 & 2), 0.53/03055 (sheets 1 & 2) and 0.52/30615 (sheets 1 & 2).

b) Cable entry shall be possible from the top and the bottom for 0.53/1833.

c) Cable entry shall be possible from the bottom only for 0.52/30614, 0.53/03055 and 0.52/30615.

d) The cabinet dust and water ingress protection rating shall be in accordance with IP40 of IEC Publication 60529.

e) The thickness of the material for the manufacture of the cabinet shall be 2 mm mild steel.

f) The cabinet shall be of a welded construction and shall be fitted with front and rear doors for 0.53/1833 and 0.53/03055. 0.52/30614 and 0.52/30615 shall be fitted with rear doors only.

g) The cabinet body shall include 22.5mm diameter holes situated next to the aluminium label holder as indicated in 0.53/1833 and 0.53/03055 and 0.52/30615. These holes are to accommodate lamps for the panel not healthy indication. These holes shall be blanked off with the suitable blanking plugs.

h) Mounting equipment brackets (vertical members) for 19” rack mounting equipment shall be provided in accordance with IEC Publication 60297 and fitted in the front of the cabinet in positions shown on the drawings 0.53/1833 and 0.53/03055. Provision shall be made so that these brackets are adjustable and can be mounted either in front of the cabinet or further back if required. These brackets shall be zinc plated and trivalent blue passivated to 25 microns.

i) The cabinets shall be fitted with type E17 trunking on both sides, as shown on the drawing. The trunking shall not obstruct the mounting of equipment.

j) Each cabinet shall be supplied with a quantity of 40 zinc plated fixing screws and cage nuts, metric of a suitable length for fixing the equipment shelves.

k) A M12 bolt eyebolt shall be fitted to each corner on the top of the cabinets. The eyebolts serve as means to lift the cabinet

l) Bolts shall be welded to the top and the bottom of both doors on the hinge side to which the braided earth straps shall be connected. Details are shown in the drawing. These bolts shall be covered or masked during the painting of the doors to keep the studs free of paint.

m) An ESD point for grounding and for a wrist strap must be provided for 0.53/1833. These banana socket positions are indicated in the drawings.

n) A 1 MΩ resistor (¼ watt) must be inserted in series between the wrist strap banana socket and ground (earth bar).

o) The banana socket used for the wrist strap must be blue in colour and labelled “ESD”.

p) The ESD for grounding must be connected directly to the earth stud.

q) The banana socket used for the ESD ground must be green in colour and labelled “ESD GND”.

3.2.2 Cabinet door

a) Door shall be constructed from mild steel with a thickness of 2 mm.

b) Door locks shall be of the lever type with facilities provided for the fitting of a padlock.

c) The door locking mechanism shall lock the door to the cabinet at the top, middle and bottom of the door.

d) All doors shall be fitted with stiffeners to make the door more rigid.

e) All doors fitted to the cabinet shall be fitted with lift-off hinges, to facilitate easy removal of the doors when in the open position, after disconnecting the braided straps.

f) The pins in the lower hinges shall be longer than the pins in the upper hinges.

g) All hinge pins shall be fixed.

h) Doors shall be of the double step design.

i) Doors shall be provided with gaskets of neoprene or an approved material. Rubber or felt gaskets are not acceptable.

3.2.3 Cabinet plinth/base frame

a) A suitable base frame/plinth made of 2.5 mm mild steel painted black shall be provided as per drawing for each cabinet.

b) Mounting holes, 4 x 10 mm diameter, shall be provided in the mounting plinth.

c) An option shall be included in the supply contract where the panels can be ordered without the plinths

d) The plinths shall be constructed with two 50mm x 100mm removable plates located on the left and right hand side of the plinth. The M6 studs used to fix the plated must be welded on the inside of the base frame.

3.2.4 Gland plates

a) Gland plates/inspection covers shall be fitted at the top and the bottom of the cabinet as indicated on 0.53/1833. The top and bottom gland plates shall be interchangeable. Gland plates for 0.52/30614, 0.53/03055 and 0.52/30615 shall be fitted at the bottom of the cabinet.

b) The gland plates and associated nuts welded to the gland plates shall be zinc electrodeposited steel (SANS/ISO 2081) and trivalent blue passivated to 25 microns.

c) The gland plates shall be manufactured as shown in the drawings. One predrilled for glands and the other as an inspection cover. The gland plates and inspection covers shall be interchangeable.

d) The gland plates shall be removable and pre-drilled. Holes shall be provided in the gland plates for fastening down to the cabinet.

e) Pre-punched cut-outs holes shall be provided in one section of the gland plates for glanding cables to the gland plate. These holes shall be pre-punched cut-outs. Details of the arrangement and holes of the gland plate are as shown on the drawings. The other section of the bottom gland plate shall remain blank as indicated on 0.53/1833.

f) All nuts and bolts used for fixing earth straps to the gland plate and between the gland plate and the cabinet frame, shall be zinc plated and trivalent chromium passivated. Hexavalent chromium passivation is prohibited.

g) Each gland plate that has been pre-drilled must consist of two M10 earthing studs with nuts, which must be welded to the gland plate. The earth stud shall protrude at the top and bottom of the gland plate, which will be fastened with bolts and welded to the gland plate.

h) All gland plates must be bolted using M8 bolts.

i) The gland plates and inspection covers shall be fabricated from 2mm mild steel.

3.2.5 Ventilation

a) Refer to drawings 0.53/1833, 0.53/03055 and 0.53/30077.

b) The top inspection cover shall have a mesh (IP35) as shown in the drawings 0.53/1833 and 0.53/30077. A metal plate situated 2.5cm above the mesh shall be provided.

c) Ventilation louvers will be provided on the top and bottom of all the doors. These ventilation louvers forming part of the steel door shall be fitted with metal screens.

d) 0.52/30614, 0.53/03055 and 0.52/30615 do not have top inspection covers but only top plates.

3.2.6 Earthing

a) Refer to drawings 0.53/1833, 0.52/30614, 0.52/30615, 0.53/03055 and 0.53/30077.

b) The cabinet shall incorporate an earth bar running vertically on the left side of the cabinet as shown on drawings. This bar shall be fastened to the cabinet, using “bite “washers, which will ensure that the earth bar is metallically bonded to the cabinet.

c) A perforated copper earth bar shall be provided with a minimum dimension of 25 x 3 mm and M6 tapped holes every 100 mm as indicated on 0.53/1833 and 0.53/30077.

d) At the top and bottom of the earth bar, an M6 tapped hole shall be provided to facilitate an earth strap connection to the top and bottom gland plates as indicated on 0.53/1833 and 0.53/30077.

e) All earth points are to be free of paint or any other non-conductive material.

f) During the assembling of the cabinet, the braided copper earth straps shall be fitted with suitable lugs and “bite” washers to ensure a proper metallic bonding of all the cabinet parts.

g) The earth bar, the mounting equipment brackets for 19” rack, and both front and back doors shall be connected to the gland plate using 12mm^2 tin-plated copper earth straps. These braided copper earth straps shall be as straight and as short as possible. The continuity between any part of the cabinet and the earthing straps all be 0,1 ohms or less.

h) Each separate plate or loose steel construction must have a welded earth stud. These studs shall be fitted with a spring or a serrated washer, plain washer and the fastening nut.

i) An earth stud must be provided on the inner right side of the cabinets to accommodate the earthing of the ESD points as indicated on 0.53/1833 and 0.53/30077.

j) Each panel shall be provided with a 50mm x 3mm tin plated copper earth bar and one connection terminal suitable for a 120 mm^2 stranded or 12mm diameter solid copper earth strap as indicated on drawings.

3.2.7 Chassis plates

a) Chassis plates shall be manufactured from mild steel with a thickness of 2 mm.

b) Din rails are of the low profile type.

c) Chassis plates are smooth powder coated white.

d) Chassis plates are earthed via earthing terminals on the din rails.

e) Chassis plates shall be fitted on each sidewall of the inside cabinet with 2 x 100mm (W) x 100mm (H) trunking as indicated on 0.52/30614, 0.52/30615 and 0.53/03055.

3.3 Circuit breaker panel

a) The circuit breaker module is used for the mounting of MCB's.

b) Refer to drawing 0.54/6079

c) The din rail mounted in the circuit breaker board must be galvanised steel/zinc coated steel which has been trivalent blue passivated.

d) The circuit breaker panel shall be a separately ordered item, and will not come fitted for every panel ordered.

e) An earth stud shall be welded on the rear of the circuit breaker panel.

f) The sides of the circuit breaker panel shall be punched with rectangular 19 inch rack attachment holes.

3.4 AC supply module

a) The AC supply module is used for AC supply connection of equipment like notebooks, test equipment, etc. while working on the equipment panel.

b) Refer to drawing 0.52/10195

c) The earth stud and the two M6 bolts that will be used to mount the din rail must be welded before painting.

d) The holes for fixing the single plug socket must be drilled before painting.

e) The module shall be fitted with a single phase, 3 pin, 16A, switched socket outlet.

f) The 1-phase socket outlet shall comply with the requirements of SANS 164:2007

g) The terminals used shall be Weidmuller (spring loaded terminals), Entrelec or Elmex terminals suitable for the wire sizes used. The associated terminal end caps and spacers shall be used.

h) The mounting flange of the AC supply module shall be punched with rectangular 19 inch rack attachment holes.

i) The AC supply module shall be a separately ordered item, and will not come fitted for every panel ordered.

3.5 Gateway internal swing frame equipment cabinet

3.5.1 General

a) The Gateway internal swing frame cabinet shall be similar in construction to that of the swing frame cabinet (3.1) with the exception of the external door and internal swing frame.

b) Detailed requirements for an internal swing frame panels are indicated in 0.52/30119 Sheet 1. This specification makes reference to "Item" numbers from the drawings. Item numbers are indicated on 052/30119 Sheet 1 as a number enclosed in a circle.

c) As the requirements for certain components of this cabinet are the same as 3.1 (swing frame cabinet), certain aspects of the D-DT-5400 drawings are also applicable (e.g. gland plates, blanking plates, plinth, etc.)

d) The complete cabinet with the door closed and blanking plates fitted shall have an IP rating of IP40.

3.5.2 Cabinet Body

a) Refer to Item 2 on 0.52/30119, Sheet 1.

b) The cabinet body shall be constructed from mild steel with a thickness of 2 mm.

c) Two strips of 100mm x 100mm trunking shall be fitted to the back plate mounting brackets as shown on 0.52/30119 Sheet 1 (Item 6). The trunking shall be mounted in a symmetrical manner such that it is equidistant from the top and bottom of the panel.

d) The cabinet shall have 4 x M12 eyebolts on each corner of the cabinet at the top (Item 1). The eyebolts serve to lift the cabinet, inclusive of schemes and other ancillary equipment, and shall allow for the lifting of the weight of the cabinet plus an additional 360kg. The detail of the lifting eye bolts are as per D-DT-5400, Sheet 4.

e) The loose rear plate on 0.52/30119, Sheet 1 (Item 5) shall have chamfered edges with rounded corners.

f) Each side wall shall include cut-out windows to be used for bus wiring. The dimensions and position of the window shall be as indicated on 0.52/30119, Sheet 1. Each window shall be covered with a removable rectangular plate (see detail in D-DT-5400), secured to the inside of the panel using a cage nut and screw. The bolt shall not protrude onto the outside of the panel.

g) Each separate plate or loose steel construction that is bolted together shall be bonded to the 3mm x 40mm copper earthing straps that are provided on the gland plates. Unless indicated to the contrary, bonding shall be achieved by way of 12mm^2 tin-plated copper earthing braid. The continuity between any part of the cabinet and the earthing straps shall be 0.1 ohms or less. The sheet metal and other fixtures that are bolted together shall be done, where possible, by welded studs and bolts.

h) Earthing studs fitted with a spring or a serrated washer, plain washer and the fastening nut shall be provided at the following locations:

- At the inside top and bottom of the rear plate; and
- On each buswire aperture cover.

i) The rear plate shall be bonded to the top and bottom earthing straps. The buswire aperture covers shall be bonded to one of the earthing straps using green PVC insulated 1000VAC multi strand 2.5mm^2 copper wire.

j) The cabinet back plate mounting rails shall be 19 inch rack standard as per IEC 60297-1 and as indicated in the drawings, and shall carry at least 110kg.

k) The cabinet rear/back 19 inch rack shall accommodate at least 44U and shall be similar in construction to that used in the swing frame cabinet (3.1).

l) The cabinet body shall accommodate an aluminium label holder as indicated in 0.52/30119, Sheet 1 and Sheet 2.

m) The cabinet body shall include a 22.5mm diameter hole situated next to the aluminium label holder as indicated in 0.52/30119, Sheet 1 and Sheet 2. This hole is to accommodate a lamp for the panel not healthy indication. A label for the lamp (width ~35mm) will be affixed next to this hole and thus space for this label shall be accommodated. This hole shall be blanked off with a suitable blanking plug.

3.5.3 Cabinet External Door

a) Refer to Item 18 on 0.52/30119 Sheet 1.

b) The external cabinet door shall be constructed from mild steel with a thickness of 2.0 mm.

c) The external door shall be provided with two cabinet locks for the purpose of securing the door when closed, and for locking the cabinet.

d) The locks shall be of the lever type with facilities provided for the fitting of a padlock.

e) All doors shall be fitted with stiffeners to make the door more rigid.

f) All doors fitted to the cabinet shall be fitted with lift-off hinges, to facilitate easy removal of the doors when in the open position, after disconnecting the braided straps.

g) The pins in the lower hinges shall be longer than the pins in the upper hinges.

h) All hinge pins shall be fixed.

i) Doors shall be provided with gaskets of neoprene or an approved material. Rubber or felt gaskets are not acceptable.

j) It is preferred, for the sake of clarity, that some of the external door dimensions be copied from a physical example.

k) The door shall have an earthing stud fitted on the bottom rear, close to the door pivot, internal to the cabinet. The stud shall be fitted with a spring or a serrated washer, plain washer and the fastening nut.

l) The door shall be bonded to the earthing strap on the bottom gland plate by way of a 12mm^2 tin-plated copper earthing braid.

3.5.4 Cabinet Internal Swing Frame

a) Refer to Item 17 on 0.52/30119 Sheet 1.

b) The internal swing frame shall be constructed from zinc plated steel, passivated blue/clear with a thickness of 2.0 mm.

c) The internal swing frame shall have an aperture of at least 46U and conform to the requirements of IEC60297-1.

d) The aperture shall allow for the tolerances on the 19 inch schemes and blanking plates to be fitted.

e) The internal swing frame design shall allow equipment with a depth of at least 350mm to be mounted on the swing frame and still allow for unrestricted opening of the internal swing frame door and unrestricted access to the rear 19 inch rails for any work related activity.

f) The internal swing frame shall be contained within the cabinet and shall allow proper closing and locking of the external door with or without equipment mounted on the internal swing frame door. Note that equipment mounted on the internal swing frame may protrude out of the swing frame by approximately 50mm.

g) The hinge/pivot point of the internal swing frame shall be on the opposite side of the hinge point of the external door. This opposing hinge design allows one to open the internal swing frame (with equipment mounted on it) and still access the rear 19 inch rack with ease.

h) The internal swing frame shall rest on sturdy pivots so as to support the full weight of the swing frame plus at least 170kg.

i) The pivot shall be designed in a manner that facilitates easy removal of the internal swing frame.

j) The pivots are to be locked in place by lock nuts.

k) The pivots shall under no circumstances be loosened by frequent opening and closing of a heavily loaded door swing frame.

l) The internal swing frame shall swing freely when fully loaded, without showing signs of sagging.

m) The pivots shall under no circumstances be loosened by frequent opening and closing of the door.

n) The opening radius of the internal swing frame shall be at least 130°.

o) The internal swing frame design shall include a door stop so as to prevent damage to the equipment mounted on the swing frame when the internal swing frame is opened to its maximum opening radius.

p) The door stop shall include a rubber stopper so as to prevent it from damaging the paint.

q) The internal swing frame shall be provided with a latch, located at the top and bottom of the frame. This latch will prevent the frame from moving, when it is latched.

r) The internal swing frame shall have a handle to allow for opening of the door once unlatched.

s) It is preferred, for the sake of clarity, that some of the internal swing frame dimensions be copied from a physical example at the Eskom premises.

t) The internal swing frame shall have an earthing stud fitted on the bottom rear i.e. close to the door pivot, internal to the cabinet. The stud shall be fitted with a spring or a serrated washer, plain washer and the fastening nut.

u) The internal swing frame shall be bonded to the earthing strap on the bottom gland plate by way of a 12mm^2 tin-plated copper earthing braid.

v) In certain applications, 80mm wide trunking will be installed on the rear side of the swing frame, down the length of the cabinet. Thus, the design of the swing frame shall be designed with the appropriate fixing studs to accommodate this requirement.

3.5.5 Cabinet Plinth

a) A suitable base frame/plinth made of 2.5 mm mild steel painted black shall be provided as per drawing (D-DT-5400).

3.5.6 Gland Plates

a) The requirements for the gland plates are as per section 3.1.5 of this document.

3.5.7 Blanking plates and cage nuts

a) The requirements for the blanking plates and cage nuts are as per section 3.1.7 and 3.1.8 of this document respectively.

3.6 Other internal swing frame equipment cabinet requirements

a) Refer to drawings 0.54/30077.

b) The internal swing frame shall rest on pivots.

c) The pivots shall be locked in place by lock nuts.

d) The pivots shall under no circumstances be loosened by frequent opening and closing of the door.

e) The 100mm x 10mm cable trays installed on the sides of the left and right hand side of the swing frame must be galvanised steel/zinc coated steel which has been trivalent blue passivated. The use of an aluminium cable tray is also acceptable.

f) The cable trays must be fixed to the frame using bolts and a 30mm bushing.

g) The internal swing frame must be zinc plated steel, passivated blue/clear and constructed from a 2mm rectangular tube.

h) The internal swing frame shall be provided with a latch, located at the top and bottom of the frame. This latch will prevent the frame from moving, when it is latched.

i) The internal swing frame cabinet shall be fitted with front door only.

j) Two strips of 100mm x 100mm trunking shall be fitted to the back plate mounting brackets as shown on 0.53/30077 note 16. The trunking shall be mounted in a symmetrical manner such that it is equidistant from the top and bottom of the panel.

3.7 Corrosion protection

After fabrication, metal surfaces including doors and removable covers shall be prepared and finished in accordance with corrosion protection standard 240-75655504. The exterior colour of the panel shall be light grey, (semi-gloss) to G29 SANS 1091 Poly-Urethane coated. The paint colour of the panel base frame shall be to SANS 1091 colour black.

The gland plates shall not be painted/powder coated, but shall be zinc coated and passivated blue. Trivalent blue passivation shall be used. Hexavalent yellow passivation shall not be used owing its hazardous nature.

3.8 Prototype

A prototype of each item shall be supplied to Eskom. Eskom shall inspect/test the prototype before acceptance.

Subject to availability of stock, a sample may be given to the suppliers passing the pre-qualification process to facilitate the manufacturing set up. Where a sample is provided, all transportation costs to and from the Eskom Simmerpan stores shall be for the Supplier's account.

4. Tests

4.1 Wiring test

The cabinet metal parts that are exposed shall be checked that they have a reading of 0.1 ohm or less between each part and the copper earthing strap. This shall include the door and all pre-fitted blanking plates.

Product tested (Stipulate item no. as per contract)	**Name and Surname of the test person**	**Date of test**	**Signature**	**Continuity test (Detail the highest reading in ohms)**	**Item Serial No.**
Item 1.1	Jack Test	07/04/2017		0.08 ohms	12345
Type of Test Meter:			Serial No.		
Date of last meter accuracy test:			Institution performing meter test:		

The test certificate shall be kept on file with the Supplier for the validity period of the product. A copy of this certificate shall be supplied with each order.

5. Marking, packaging, labelling and transport

5.1 Marking

The outside of the packaging will be clearly marked indicating:

a) Substation name;

b) Detailed delivery address;

c) Detailed content description as per order;

d) Dispatch date; and

e) Eskom and Supplier order number.

5.2 Packaging and labelling

The products ordered shall be packed in high specification impact resistant corrugated cardboard or a wooden crate with a waterproof outer plastic covering. This shall ensure that the equipment is protected from damage in the event of a light drizzle as well as protected from bumps and scratches that could occur from normal handling and transport. The package shall be clearly labelled with the sub-station name, full delivery address, Eskom and supplier order number, despatch date and the contents of the package.

A permanent label, preferably of the metal type shall be affixed inside the panel stating the following information.

a) Name of supplier

b) Suppliers address and contact details

c) Eskom's order number

d) Suppliers internal job number

e) Date of manufacture and serial number. Each cabinet must have a unique serial number.

5.3 Transport

Where requested, provision is to be made for transport of the product from the supplier's works to the end user. The supplier shall also off load the equipment at the destination. Where the equipment is too heavy for off-loading by hand, the supplier shall ensure that the necessary off-loading aids are available. The truck used for transport shall be the enclosed type or at least have a waterproof tarpaulin over the load. Prior to dispatch the supplier shall telephonically confirm the availability of a receiving agent.

		DAILY RATE	**RATE PER RUNNING KILOMETER**				
DISTANCE TONNAGE		100-450	451-1000	1001-1500	1501-2000	2001-2500	2501-3000
0 – 1	TON	R	R	R	R	R	R
1.1 – 3	TON	R	R	R	R	R	R

6. Drawings and type of cabinets

The construction of the cabinets shall be according to the approved Eskom Drawings. However if the construction of the cabinets differ from Eskom Master Drawings, then the general arrangement drawings (GA's) from the supplier must be submitted to Eskom, for approval, prior to construction.

Table 1: Master drawing numbers for the cabinets

Drawing Name	Drawing No.	Revision
Swing frame cabinet (800 x 600 x 2400)	D-DT-5400 Sheet 1	5
	Sheet 2	5
	Sheet 3	5
	Sheet 4	4
	Sheet 5	4
	Sheet 6	3
Standard equipment Cabinet (600 x 600 x 1850/2200/2400)	0.53/1833 Sheet 0	9
	Sheet 1	3
Circuit Breaker Board face plate for standard equipment cabinet	0.54/6079 Sheet 0	3
Metering Equipment cabinet (600 x 600 x 2400)	0.52/30614 Sheet 1	1

	Sheet 2 Sheet 3	1 0
Automation Equipment cabinet (600 x 600 x 2400)	0.53/03055 Sheet 1 Sheet 2 Sheet 3	0 0 0
Internal Swing Frame Equipment cabinet (800 x 600 x 2400)	0.53/30077 Sheet 0 Sheet 1	3 3
Gateway Internal Swing Frame cabinet (800 x 600 x 2400)	0.52/30119 Sheet 1 Sheet 2 Sheet 3	0 0 0
Protection fixed frame equipment cabinet (800 x 600 x 2400)	0.52/30615 Sheet 1 Sheet 2 Sheet 3	2 2 0
Buszone Protection swing frame cabinet (800 x 600 x 2400)	0.52/30616 Sheet 1 Sheet 1A Sheet 2 Sheet 3 Sheet 4 Sheet 5 Sheet 6	4 0 3 3 2 2 2
AC Supply Module	0.52/10195 Sheet 0	0

7. Authorization

This document has been seen and accepted by:

Name and surname	Designation
Nelson Luthuli	PTM&C Senior Manager (Acting)
Andre De La Guerre	Protection Technology and Support Manager
Kashveer Jagdaw	DC and Auxiliary Supplies SC Chairperson

8. Revisions

Date	Rev	Compiler	Remarks
April 2021	5	AN Majozi	• Added section 3.5, Gateway internal swing frame equipment cabinet • Added 2 types of cabinets, i.e. Automation and Gateway internal swing frame equipment cabinets • 3.2.2(a) changed cabinet door thickness from 1,6mm to 2mm. • Added section 3.2.7 Chassis plates.

Date	Rev	Compiler	Remarks
April 2019	4	AN Majozi	Added the following cabinets types, • Metering equipment cabinet • Protection swing frame cabinet • Protection fixed frame cabinet
Feb 2018	3	AN Majozi	Authorized document Revised the following clauses: • 3.2.2(a) changed cabinet door size from 2,5mm to 1,6mm. • 3.5 Renamed Telecomms swing frame cabinet as Internal Swing frame equipment cabinet • 3.5(f) changed bushing size from 50mm to 40mm. • Added Annexures H – internal swing frame photographs
Oct 2015	2	AN Majozi	Changed copper earth bar from 16 x 3mm to 25 x 3 mm Consolidated specification for the swing frame panel and blanking plates: DSP 34-464
Sept 2013	1	K Naicker	ESD Changed passivation of zinc coatings to trivalent blue Ventilation Added circuit breaker panel Added AC supply module Added Swing Frame Panel Format changed to SCOT Template and document number changed to 240-60725641
Sept 2001	0	PT Griffith	Original issue.

9. Development team

- Alpheus Majozi

10. Acknowledgements

Paul Gerber, Haggai Sithole, Stuart van Zyl, Kuben Naicker, Paddy Griffith, Antonio Pereira, Lameck Mkorongo and Gordon Payne for the compiling the original documents that this Standard is based on.

Annex A – A/B schedules for a Swing frame cabinet

Enquiry No.: …….. Tenderer's name: ……..

Project Name: …… Date: ……..

Technical A/B schedules for a Swing frame cabinet

Numbers refer to clauses in the specification

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

a) The supplier shall clearly, for each clause that requires a statement of compliance in the A/B schedules, respond by either stating "Comply" or "Do not Comply" and state deviation details. Any form of deviation must be accompanied by a reference number and full details of the deviation must be supplied in the deviations list applicable to the reference number.

b) If a clause in the A/B schedule requires a statement of compliance and additional information, the supplier shall state clearly "Comply" and shall provide detail information or state "Do not Comply" and shall provide detail information.

c) If a clause in the A/B schedule requires information only, the supplier shall provide the necessary information.

Item	Description	Schedule A	Schedule B
3.1.1	**General**		
a)	Cabinet to comply with D-DT-5400 and 0.52/30616 (Sheets 1 to 6)	Comply	
b)	IP rating of cabinet with door closed, blanking plates fitted	IP40	
3.1.2	**Cabinet body**		
a)	Manufactured from mild steel, 2mm thick	Comply	
b)	Lifting eye bolts, 4 off capable of supporting safely 360 kg + the mass of the cabinet.	Comply	
c)	All loose steel constructions that are bolted together to be bonded to the earthing straps on the gland plates. Unless indicated to the contrary, 12 mm^2 tinned braided copper strap shall be used for this purpose. No metal part of the cabinet may have a resistance to the earth strap exceeding 0.1 ohms	Comply	
d)	Two strips of trunking, 100 mm x 100mm to be installed with equidistant spacing from the top and bottom of the panel.	Comply	
e)	Buswiring apertures and covers provided as per drawing. Bonding as indicated	Comply	
f)	Earthing studs to be provided as indicated	Comply	
3.1.3	**Cabinet door**		
a)	Manufactured from mild steel, 2.5 mm thick.	Comply	
b)	48 U x 488 mm rack aperture. Rack mounting holes as per IEC 60297-1 applied to buttressing, recessed behind front panel.	Comply	

Item	Description	Schedule A	Schedule B
c)	Door stop as per drawing	Comply	
d)	Pivots as per drawing and sample.	Comply	
e)	Two lever-type latches with locking facility.	Specify type	
f)	Door can support mass of 250 kg without distortion or sagging.	Comply	
g)	Earthing stud provided. Bonding as indicated using 12 mm^2 tinned braided copper strap.	Comply	
3.1.4	**Cabinet back plate mounting rails**		
a)	19 inch (482.6 mm) rack standard as per IEC 60297-1.	Comply	
b)	The rack shall carry a mass of at least 110 kg.	Comply	
3.1.5	**Gland plate**		
a)	Manufactured from passivated mild steel.	Comply	
b)	Pre-punched or drilled cable cut outs, push out type or with hole plugs.	Specify method	
c)	Copper earthing bars to be fitted on both top and bottom gland plates.	Comply	
d)	The top front gland plate shall have extruded air vents with a mesh underside to keep out insects.	Comply	
e)	Gland plates to be interchangeable (front to back and top to bottom)	Comply	
3.1.6	**Optional accessories**		
a)	Plinth-mounting angle iron and cabinet support brackets to be provided if requested at time of enquiry.	Comply	
3.1.7	**Blanking plates**		
a)	To be manufactured from mild steel 2 mm thick. Size to range from 1U to 13U. IEC 60297-1 shall apply.	Comply	
b)	Closed holes with dimensions as indicated	Comply	
3.1.8	**Cage nut**		
a)	Standard cage nut with spring clip bolt and plastic washer. As per sample or approved by Eskom.	Subject to Eskom approval	
3.6	**Corrosion protection**		
a)	Corrosion protection as per 240-75655504, standard DS1 (Powder coating).	Comply	
b)	Panel Colours (to SANS 1091): Cabinet: Plinth:	 Colour G29 Black	
c)	Gland plates to be unpainted, zinc coated and passivated yellow.	Comply	

Item	Description	Schedule A	Schedule B
3.7	**Prototype**		
a)	Prototype to be provided if requested	Comply	
b)	Supplier to pay for transport costs where a sample is supplied by Eskom on loan	Yes	
4.1	**Tests**		
a)	Supplier to test panel continuity and keep records as indicated	Comply	
b)	Accredited test equipment. Verifiable at Eskom's request.	Comply	
5.2	**Labelling**		
a)	Durable label to be provided inside panel	Comply	
5.2	**Packaging**		
a)	Packaging to be durable and waterproof. Panel locks to be removed if they can cause damage to the packaging.	Comply	
5.1	**Marking**		
a)	Outside of the packaging to be marked as indicated.	Comply	
5.3	**Transport**		
a)	Where requested, as per 5.3 with itemised cost per range.	Specify	

Annex B – A/B Schedules for Fixed Frame Cabinet

Enquiry No.: …….. Tenderer's name: ……..

Project Name: ……. Date: ……..

Technical A/B Schedules for Fixed Frame Cabinet

Numbers refer to clauses in the specification

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

a) The supplier shall clearly, for each clause that requires a statement of compliance in the A/B schedules, respond by either stating "Comply" or "Do not Comply" and state deviation details. Any form of deviation must be accompanied by a reference number and full details of the deviation must be supplied in the deviations list applicable to the reference number.

b) If a clause in the A/B schedule requires a statement of compliance and additional information, the supplier shall state clearly "Comply" and shall provide detail information or state "Do not Comply" and shall provide detail information.

c) If a clause in the A/B schedule requires information only, the supplier shall provide the necessary information.

Item	Description	Schedule A	Schedule B
3.2.1	**Cabinet body**		
a)	Cabinet to comply with 0.53/1833 Sheets 0 to 1, 0.52/30614, 0.53/03055 and 0.52/30615 (Sheets 1 to 2)	Comply	
b)	Ingress Protection rating of cabinet – IP40	Comply	
c)	Manufactured from mild steel, 2mm thick	Comply	
d)	19'' rack mounting equipment brackets shall be zinc plated steel and trivalent blue passivated to 25 microns.	Comply	
e)	Each cabinet shall be supplied with 40 zinc plated fixing screws and cage nuts.	Comply	
f)	All nuts and bolts shall be zinc coated and trivalent blue passivated.	Comply	
g)	The cabinets shall be fitted with type E17 trunking on both sides, as shown on the drawing. The trunking shall not obstruct the mounting of equipment.	Comply	
h)	Bolts shall be welded to the top and the bottom of both doors on the hinge side to which the braided earth straps shall be connected. Details are shown in the drawing.	Comply	
i)	An ESD point for grounding and for a wrist strap, as indicated in the drawings shall be provided. The ESD for grounding must be connected directly to the earth stud.	Comply	
3.2.2	**Cabinet door**		
a)	Manufactured from mild steel, 2 mm thick.	Comply	

Item	Description	Schedule A	Schedule B
b)	The door locking mechanism shall lock the door to the cabinet at the top, middle and bottom of the door.	Comply	
c)	All doors shall be fitted with lift-off hinges, to facilitate easy removal of the doors when in the open position, after disconnecting the braided straps.	Comply	
d)	The pins in the lower hinges shall be longer than the pins in the upper hinges. All hinge pins shall be fixed.	Comply	
e)	Two lever-type latches with locking facility.	Specify type	
f)	Doors shall be provided with gaskets of neoprene or an approved material. Rubber or felt gaskets are not acceptable.	Comply	
3.2.3	**Cabinet plinth/base frame**		
a)	A suitable base frame/plinth made of 2.5 mm mild steel painted black shall be provided as per drawing for each cabinet.	Comply	
b)	Mounting holes, 4 x 10 mm diameter, shall be provided in the mounting plinth.	Comply	
c)	The plinths shall be constructed with two 50mm x 100mm removable plates located on the left and right hand side of the plinth. The M6 studs used to fix the plated must be welded on the inside of the base frame.	Comply	
3.2.4	**Gland plates**		
a)	Refer to section 3.2.4 of specification	Comply	
b)	Manufactured from passivated mild steel.	Comply	
c)	The gland plates shall be manufactured in two sections as shown in the drawing. One predrilled for glands and the other as an inspection cover. The gland plates and inspection covers shall be interchangeable.	Comply	
d)	To be provided on the top and bottom of the cabinet and will consist of an inspection cover and gland plate.	Comply	
e)	Pre-drilled holes shall be provided in one section of the gland plates for glanding cables to the gland plate. These holes shall be closed with plastic filler plugs.	Comply	
f)	All nuts and bolts used for fixing earth straps to the gland plate and between the gland plate and the cabinet frame, shall be zinc plated and trivalent chromium passivated	Comply	
3.2.5	**Ventilation**		

Item	Description	Schedule A	Schedule B
a)	The top inspection cover shall have a mesh (IP35) as shown in the drawing. A metal plate situated 2.5cm above the mesh shall be provided.	Comply	
b)	Ventilation louvers will be provided on the top and bottom of all the doors. These ventilation louvers forming part of the steel door shall be fitted with metal screens.	Comply	
3.2.6	**Earthing**		
a)	The cabinet shall incorporate an earth bar running vertically on the left side of the cabinet as shown on drawing. This bar shall be fastened to the cabinet, using "bite "washers, which will ensure that the earth bar is metallically bonded to the cabinet.	Comply	
b)	A perforated copper earth bar shall be provided with a minimum dimension of 25 x 3 mm and M6 tapped holes every 100 mm.	Comply	
c)	At the top and bottom of the earth bar, an M6 tapped hole shall be provided to facilitate an earth strap connection to the top and bottom gland plates.	Comply	
d)	The earth bar, the mounting equipment brackets for 19" rack, and both front and back doors shall be connected to the gland plate using 12mm^2 tin-plated copper earth straps. These braided copper earth straps shall be as straight and as short as possible. The continuity between any part of the cabinet and the earthing straps all be 0,1 ohms or less.	Comply	
e)	An earth stud must be provided on the inner right side of the cabinets to accommodate the earthing of the ESD points.	Comply	
3.2.7	**Chassis plates**		
a)	Chassis plates shall be manufactured from mild steel with a thickness of 2 mm.	Comply	
b)	Din rails are of the low profile type.	Comply	
c)	Chassis plates are smooth powder coated white.	Comply	
d)	Chassis plates are earthed via earthing terminals on the din rails.	Comply	

Item	Description	Schedule A	Schedule B
e)	Chassis plates shall be fitted on each sidewall of the inside cabinet with 2 x 100mm (W) x 100mm (H) trunking as indicated on 0.52/30614, 0.52/30615 and 0.53/03055.	Comply	
3.6	**Corrosion protection**		
a)	Corrosion protection as per 240-75755504, standard DS1 (Powder coating).	Comply	
b)	Panel Colours (to SANS 1091): Cabinet: Plinth:	 Colour G29 Black	
c)	Gland plates to be unpainted, zinc coated and passivated yellow.	Comply	
3.7	**Prototype**		
a)	Prototype to be provided if requested	Comply	
b)	Supplier to pay for transport costs where a sample is supplied by Eskom on loan	Yes	
4.1	**Tests**		
a)	Supplier to test panel continuity and keep records as indicated	Comply	
b)	Accredited test equipment. Verifiable at Eskom's request.	Comply	
5.2	**Labelling**		
a)	Durable label to be provided inside panel	Comply	
5.2	**Packaging**		
a)	Packaging to be durable and waterproof. Panel locks to be removed if they can cause damage to the packaging.	Comply	
5.1	**Marking**		
a)	Outside of the packaging to be marked as indicated.	Comply	
5.3	**Transport**		
a)	Where requested, as per 5.3 with itemised cost per range.	Specify	

Annex C – A/B Schedules for Gateway Internal Swing Frame Cabinet

Enquiry No.: …….. Tenderer's name: ……..

Project Name: ……. Date: ……..

Technical A/B Schedules for Gateway Internal Swing Frame Cabinet

Numbers refer to clauses in the specification

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

a) The supplier shall clearly, for each clause that requires a statement of compliance in the A/B schedules, respond by either stating "Comply" or "Do not Comply" and state deviation details. Any form of deviation must be accompanied by a reference number and full details of the deviation must be supplied in the deviations list applicable to the reference number.

b) If a clause in the A/B schedule requires a statement of compliance and additional information, the supplier shall state clearly "Comply" and shall provide detail information or state "Do not Comply" and shall provide detail information.

c) If a clause in the A/B schedule requires information only, the supplier shall provide the necessary information.

Item	Description	Schedule A	Schedule B
3.5.1	**General**		
a)	Cabinet to comply with 0.52/30119	Comply	
b)	Ingress Protection rating of cabinet – IP40	Comply	
c)	Manufactured from mild steel, 2mm thick	Comply	
3.5.2	**Cabinet body**		
a)	Manufactured from mild steel, 2mm thick	Comply	
b)	Lifting eye bolts, 4 off capable of supporting safely 360 kg + the mass of the cabinet.	Comply	
c)	All loose steel constructions that are bolted together to be bonded to the earthing straps on the gland plates. Unless indicated to the contrary, 12 mm^2 tinned braided copper strap shall be used for this purpose. No metal part of the cabinet may have a resistance to the earth strap exceeding 0.1 ohms	Comply	
d)	Two strips of trunking, 100 mm x 100mm to be installed with equidistant spacing from the top and bottom of the panel.	Comply	
e)	Buswiring apertures and covers provided as per drawing. Bonding as indicated	Comply	
f)	Earthing studs to be provided as indicated	Comply	
j)	The cabinet back plate mounting rails shall be 19 inch rack standard as per IEC 60297-1 and as indicated in the drawings, and shall carry at least 110kg.	Comply	

Item	Description	Schedule A	Schedule B
k)	The cabinet rear/back 19 inch rack shall accommodate at least 47U.	Comply	
l)	The cabinet body shall accommodate an aluminium label holder as indicated in 0.52/30119, Sheet 1.	Comply	
m)	The cabinet body shall include a 22.5mm diameter hole situated next to the aluminium label holder as indicated in 0.52/30119, Sheet 1. This hole is to accommodate a lamp for the panel not healthy indication. A label for the lamp (width ~35mm) will be affixed next to this hole and thus space for this label shall be accommodated. This hole shall be blanked off with a suitable plug blanking plug that is bolted or screwed.	Comply	
3.5.3	**Cabinet external door**		
b)	Manufactured from mild steel, 2 mm thick.	Comply	
c)	The external door shall be provided with two cabinet locks for the purpose of securing the door when closed, and for locking the cabinet.	Comply	
d)	The locks shall be of the lever type with facilities provided for the fitting of a padlock.	Specify Type	
e)	All doors shall be fitted with stiffeners to make the door more rigid.	Comply	
f)	All doors fitted to the cabinet shall be fitted with lift-off hinges, to facilitate easy removal of the doors when in the open position, after disconnecting the braided straps.	Comply	
g)	The pins in the lower hinges shall be longer than the pins in the upper hinges.	Comply	
h)	All hinge pins shall be fixed.	Comply	
i)	Doors shall be provided with gaskets of neoprene or an approved material. Rubber or felt gaskets are not acceptable.	Comply	
k)	The door shall have an earthing stud fitted on the bottom rear, close to the door pivot, internal to the cabinet. The stud shall be fitted with a spring or a serrated washer, plain washer and the fastening nut.	Comply	
l)	The door shall be bonded to the earthing strap on the bottom gland plate by way of a 12mm2 tin-plated copper earthing braid.	Comply	
3.5.4	**Cabinet Internal Swing Frame**		

Item	Description	Schedule A	Schedule B
b)	The internal swing frame shall be constructed from zinc plated steel, passivated blue/clear with a thickness of 2.0 mm.	Comply	
c)	The internal swing frame shall have an aperture of at least 46U and conform to the requirements of IEC60297-1.	Comply	
d)	The aperture shall allow for the tolerances on the 19 inch schemes and blanking plates to be fitted.	Comply	
e)	The internal swing frame design shall allow equipment with a depth of at least 350mm to be mounted on the swing frame and still allow for unrestricted opening of the internal swing frame door and unrestricted access to the rear 19 inch rails for any work related activity.	Comply	
f)	The internal swing frame shall be contained within the cabinet and shall allow proper closing and locking of the external door with or without equipment mounted on the internal swing frame door. Note that equipment mounted on the internal swing frame may protrude out of the swing frame by approximately 50mm.	Comply	
g)	The hinge/pivot point of the internal swing frame shall be on the opposite side of the hinge point of the external door. This opposing hinge design allows one to open the internal swing frame (with equipment mounted on it) and still access the rear 19 inch rack with ease.	Comply	
h)	The internal swing frame shall rest on sturdy pivots so as to support the full weight of the swing frame plus at least 170kg.	Comply	
i)	The pivot shall be designed in a manner that facilitates easy removal of the internal swing frame.	Comply	
j)	The pivots are to be locked in place by lock nuts.	Comply	
k)	The pivots shall under no circumstances be loosened by frequent opening and closing of a heavily loaded door swing frame.	Comply	
l)	The internal swing frame shall swing freely when fully loaded, without showing signs of sagging.	Comply	
m)	The pivots shall under no circumstances be loosened by frequent opening and closing of the door.	Comply	

Item	Description	Schedule A	Schedule B
n)	The opening radius of the internal swing frame shall be at least 130°.	Comply	
o)	The internal swing frame design shall include a door stop so as to prevent damage to the equipment mounted on the swing frame when the internal swing frame is opened to its maximum opening radius.	Comply	
p)	The internal swing frame shall be provided with a latch, located at the top and bottom of the frame. This latch will prevent the frame from moving, when it is latched.	Comply	
q)	The internal swing frame shall be provided with a latch, located at the top and bottom of the frame. This latch will prevent the frame from moving, when it is latched.	Comply	
r)	The internal swing frame shall have a handle to allow for opening of the door once unlatched.	Comply	
t)	The internal swing frame shall have an earthing stud fitted on the bottom rear i.e. close to the door pivot, internal to the cabinet. The stud shall be fitted with a spring or a serrated washer, plain washer and the fastening nut.	Comply	
u)	The internal swing frame shall be bonded to the earthing strap on the bottom gland plate by way of a 12mm2 tin-plated copper earthing braid.	Comply	
v)	In certain applications, 80mm wide trunking will be installed on the rear side of the swing frame, down the length of the cabinet. Thus, the design of the swing frame shall be designed with the appropriate fixing studs to accommodate this requirement.	Comply	
3.5.5	**Cabinet plinth/base frame**		
a)	A suitable base frame/plinth made of 2.5 mm mild steel painted black shall be provided as per drawing (D-DT-5400 and 0.52/30119).	Comply	
3.5.6	**Gland plates**		
a)	Manufactured from passivated mild steel.	Comply	
b)	Pre-punched or drilled cable cut outs, push out type or with hole plugs.	Specify method	
c)	Copper earthing bars to be fitted on both top and bottom gland plates.	Comply	
d)	The top front gland plate shall have extruded air vents with a mesh underside to keep out insects.	Comply	

Item	Description	Schedule A	Schedule B
e)	Gland plates to be interchangeable (front to back and top to bottom)	Comply	
3.5.7	**Blanking plates and Cage Nuts**		
a)	To be manufactured from mild steel 2 mm thick. Size to range from 1U to 13U. IEC 60297-1 shall apply.	Comply	
b)	Closed holes with dimensions as indicated	Comply	
c)	Standard cage nut with spring clip bolt and plastic washer. As per sample or approved by Eskom.	Subject to Eskom approval	
3.6	**Corrosion protection**		
a)	Corrosion protection as per 240-75655504, standard DS1 (Powder coating).	Comply	
b)	Panel Colours (to SANS 1091): Cabinet: Plinth:	 Colour G29 Black	
c)	Gland plates to be unpainted, zinc coated and passivated yellow.	Comply	
3.7	**Prototype**		
a)	Prototype to be provided if requested	Comply	
b)	Supplier to pay for transport costs where a sample is supplied by Eskom on loan	Yes	
4.1	**Tests**		
a)	Supplier to test panel continuity and keep records as indicated	Comply	
b)	Accredited test equipment. Verifiable at Eskom's request.	Comply	
5.2	**Labelling**		
a)	Durable label to be provided inside panel	Comply	
5.2	**Packaging**		
a)	Packaging to be durable and waterproof. Panel locks to be removed if they can cause damage to the packaging.	Comply	
5.1	**Marking**		
a)	Outside of the packaging to be marked as indicated.	Comply	
5.3	**Transport**		
a)	Where requested, as per 5.3 with itemised cost per range.	Specify	

Annex D – A/B Schedules for Other Internal Swing Frame Cabinet

Enquiry No.: …….. Tenderer's name: ……..

Project Name: ……. Date: ……..

Technical A/B Schedules for Other Internal Swing Frame Cabinet

Numbers refer to clauses in the specification

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

a) The supplier shall clearly, for each clause that requires a statement of compliance in the A/B schedules, respond by either stating "Comply" or "Do not Comply" and state deviation details. Any form of deviation must be accompanied by a reference number and full details of the deviation must be supplied in the deviations list applicable to the reference number.

b) If a clause in the A/B schedule requires a statement of compliance and additional information, the supplier shall state clearly "Comply" and shall provide detail information or state "Do not Comply" and shall provide detail information.

c) If a clause in the A/B schedule requires information only, the supplier shall provide the necessary information.

Item	Description	Schedule A	Schedule B
3.2.1	**Cabinet body**		
a)	Cabinet to comply with 0.53/30077	Comply	
b)	Ingress Protection rating of cabinet – IP40	Comply	
c)	Manufactured from mild steel, 2mm thick	Comply	
d)	19'' rack mounting equipment brackets shall be zinc plated steel and trivalent blue passivated to 25 microns.	Comply	
e)	Each cabinet shall be supplied with 40 zinc plated fixing screws and cage nuts.	Comply	
f)	All nuts and bolts shall be zinc coated and trivalent blue passivated.	Comply	
g)	The cabinets shall be fitted with type E17 trunking on both sides, as shown on the drawing. The trunking shall not obstruct the mounting of equipment.	Comply	
h)	Bolts shall be welded to the top and the bottom of both doors on the hinge side to which the braided earth straps shall be connected. Details are shown in the drawing.	Comply	
i)	An ESD point for grounding and for a wrist strap, as indicated in the drawings shall be provided. The ESD for grounding must be connected directly to the earth stud.	Comply	
3.2.2	**Cabinet door**		
a)	Manufactured from mild steel, 2 mm thick.	Comply	

Item	Description	Schedule A	Schedule B
b)	The door locking mechanism shall lock the door to the cabinet at the top, middle and bottom of the door.	Comply	
c)	All doors shall be fitted with lift-off hinges, to facilitate easy removal of the doors when in the open position, after disconnecting the braided straps.	Comply	
d)	The pins in the lower hinges shall be longer than the pins in the upper hinges. All hinge pins shall be fixed.	Comply	
e)	Two lever-type latches with locking facility.	Specify type	
f)	Doors shall be provided with gaskets of neoprene or an approved material. Rubber or felt gaskets are not acceptable.	Comply	
3.2.3	**Cabinet plinth/base frame**		
a)	A suitable base frame/plinth made of 2.5 mm mild steel painted black shall be provided as per drawing for each cabinet.	Comply	
b)	Mounting holes, 4 x 10 mm diameter, shall be provided in the mounting plinth.	Comply	
c)	The plinths shall be constructed with two 50mm x 100mm removable plates located on the left and right hand side of the plinth. The M6 studs used to fix the plated must be welded on the inside of the base frame.	Comply	
3.2.4	**Gland plates**		
a)	Refer to section 3.2.4 of specification	Comply	
b)	Manufactured from passivated mild steel.	Comply	
c)	The gland plates shall be manufactured in two sections as shown in the drawing. One predrilled for glands and the other as an inspection cover. The gland plates and inspection covers shall be interchangeable.	Comply	
d)	To be provided on the top and bottom of the cabinet and will consist of an inspection cover and gland plate.	Comply	
e)	Pre-drilled holes shall be provided in one section of the gland plates for glanding cables to the gland plate. These holes shall be closed with plastic filler plugs.	Comply	
f)	All nuts and bolts used for fixing earth straps to the gland plate and between the gland plate and the cabinet frame, shall be zinc plated and trivalent chromium passivated	Comply	
3.2.5	**Ventilation**		

Item	Description	Schedule A	Schedule B
a)	The top inspection cover shall have a mesh (IP35) as shown in the drawing. A metal plate situated 2.5cm above the mesh shall be provided.	Comply	
b)	Ventilation louvers will be provided on the top and bottom of all the doors. These ventilation louvers forming part of the steel door shall be fitted with metal screens.	Comply	
3.2.6	**Earthing**		
a)	The cabinet shall incorporate an earth bar running vertically on the left side of the cabinet as shown on drawing. This bar shall be fastened to the cabinet, using "bite "washers, which will ensure that the earth bar is metallically bonded to the cabinet.	Comply	
b)	A perforated copper earth bar shall be provided with a minimum dimension of 25 x 3 mm and M6 tapped holes every 100 mm.	Comply	
c)	At the top and bottom of the earth bar, an M6 tapped hole shall be provided to facilitate an earth strap connection to the top and bottom gland plates.	Comply	
d)	The earth bar, the mounting equipment brackets for 19" rack, and both front and back doors shall be connected to the gland plate using 12mm^2 tin-plated copper earth straps. These braided copper earth straps shall be as straight and as short as possible. The continuity between any part of the cabinet and the earthing straps all be 0,1 ohms or less.	Comply	
e)	An earth stud must be provided on the inner right side of the cabinets to accommodate the earthing of the ESD points.	Comply	
3.5	**Internal Swing frame equipment cabinet**		
a)	The internal swing frame shall rest on pivots. The pivots shall be locked in place by lock nuts. The pivots shall under no circumstances be loosened by frequent opening and closing of the door.	Comply	
b)	The 100mm x 10mm cable trays installed on the sides of the left and right hand side of the swing frame must be galvanised steel/zinc coated steel which has been trivalent blue passivated. The cable trays must be fixed to the frame using bolts and a 40mm bushing.	Comply	

Item	Description	Schedule A	Schedule B
c)	The swing frame shall be provided with a latch, located at the top and bottom of the frame. This latch will prevent the frame from moving, when it is latched.	Comply	
d)	Two strips of 100mm x 100mm trunking shall be fitted to the back plate mounting brackets as shown on 0.53/30077. The trunking shall be mounted in a symmetrical manner such that it is equidistant from the top and bottom of the panel.	Comply	
3.6	**Corrosion protection**		
a)	Corrosion protection as per 240-75655504, standard DS1 (Powder coating).	Comply	
b)	Panel Colours (to SANS 1091): Cabinet: Plinth:	 Colour G29 Black	
c)	Gland plates to be unpainted, zinc coated and passivated yellow.	Comply	
3.7	**Prototype**		
a)	Prototype to be provided if requested	Comply	
b)	Supplier to pay for transport costs where a sample is supplied by Eskom on loan	Yes	
4.1	**Tests**		
a)	Supplier to test panel continuity and keep records as indicated	Comply	
b)	Accredited test equipment. Verifiable at Eskom's request.	Comply	
5.2	**Labelling**		
a)	Durable label to be provided inside panel	Comply	
5.2	**Packaging**		
a)	Packaging to be durable and waterproof. Panel locks to be removed if they can cause damage to the packaging.	Comply	
5.1	**Marking**		
a)	Outside of the packaging to be marked as indicated.	Comply	
5.3	**Transport**		
a)	Where requested, as per 5.3 with itemised cost per range.	Specify	

Annex E – A/B Schedules for Circuit Breaker Panel

Enquiry No.: …….. Tenderer's name: ……..

Project Name: ……. Date: ……..

Technical A/B Schedules – Circuit Breaker Panel

Numbers refer to clauses in the specification

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

a) The supplier shall clearly, for each clause that requires a statement of compliance in the A/B schedules, respond by either stating "Comply" or "Do not Comply" and state deviation details. Any form of deviation must be accompanied by a reference number and full details of the deviation must be supplied in the deviations list applicable to the reference number.

b) If a clause in the A/B schedule requires a statement of compliance and additional information, the supplier shall state clearly "Comply" and shall provide detail information or state "Do not Comply" and shall provide detail information.

c) If a clause in the A/B schedule requires information only, the supplier shall provide the necessary information.

No	Items	Description	Schedule A	Schedule B
1	Construction	Refer to section 3.3 of specification	Comply	
1.1		Fabrication 2 mm Mild steel	Comply	
1.2	Dimensions	Refer to drawing	Comply	
1.3		All nuts and bolts shall be zinc coated and trivalent blue passivated.	Comply	
2	Earthing	Refer to section 3.2.6 of specification. Earth stud shall be provided	Comply	
3	Corrosion Protection	Refer to section 3.6 of specification	Comply	
4	Packaging and Labelling	Refer to section 5 of specification	Comply	
5	Drawing	0.54/6079 Rev 3	Yes	

Annex F – A/B Schedules for AC Supply Module

Enquiry No.: …….. Tenderer's name: ……..

Project Name: ……. Date: ……..

Technical A/B Schedules – AC Supply Module

Numbers refer to clauses in the specification

Schedule A: Purchaser's specific requirements

Schedule B: Particulars of equipment to be supplied

a) The supplier shall clearly, for each clause that requires a statement of compliance in the A/B schedules, respond by either stating "Comply" or "Do not Comply" and state deviation details. Any form of deviation must be accompanied by a reference number and full details of the deviation must be supplied in the deviations list applicable to the reference number.

b) If a clause in the A/B schedule requires a statement of compliance and additional information, the supplier shall state clearly "Comply" and shall provide detail information or state "Do not Comply" and shall provide detail information.

c) If a clause in the A/B schedule requires information only, the supplier shall provide the necessary information.

No	Items	Description	Schedule A	Schedule B
1	Construction	Refer to section 3.4 of specification	Comply	
1.1		Fabrication 2 mm Mild steel	Comply	
1.2		All nuts and bolts shall be zinc coated and trivalent blue passivated.	Comply	
2	Earthing	Refer to section 3.2.6 of specification. Earthing stud shall be provided	Comply	
3	Corrosion Protection	Refer to section 3.6 of specification	Comply	
4	Packaging and Labelling	Refer to section 5 of specification	Comply	
5	Drawing	0.52/10195 Rev 0	Yes	

Annex G – Distribution swing frame cabinet

G.1 Cabinet

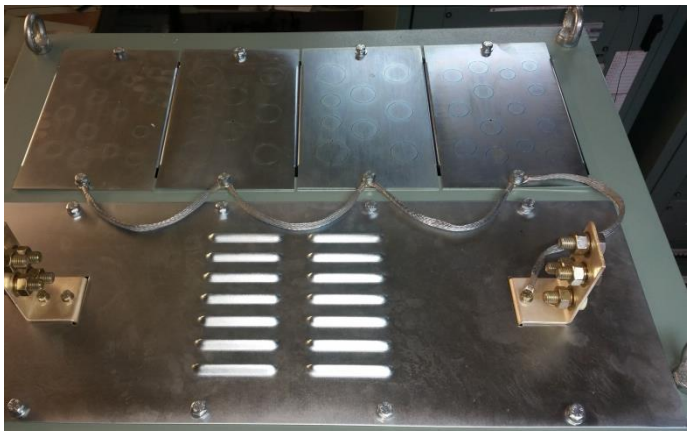
G.2 Rear detail

(Note rear panel chamfered edges and rounded corner)

G.3 Gland plate detail (Top and bottom)

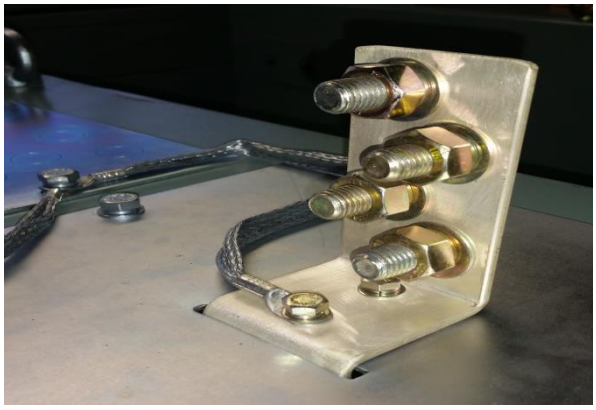
(Bottom gland plate, with braided earthing strap.)

(Top view of top entry gland plates, Note vented extrusion and 4 lifting bolts in each corner)

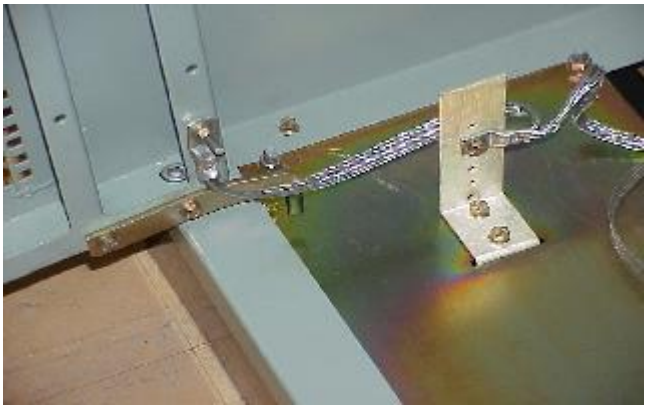


G.4 Interior, earthing and hinging detail

(Earth bar passing through gland plate and lifting lug.)



(Interior earthing - note loop to door, trunking and the earthing of the loose back plate. Note door stop bar, this prevents the door from opening too wide and damaging the paint work.)



Annex H – Internal swing frame equipment cabinet

H.1 Cabinet

H.2 Electrostatic Discharge (ESD) points

H.3 Pivots

Bottom pivot

Top pivot