31-SDMS-09

REV.0

SPECIFICATION FOR

SINGLE / DUAL LOW VOLTAGE DISTRIBUTION PANEL

Revision History

#	Date	Revision No.	Revised By	Major Revision Description

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1. SCOPE

This SEC Distribution Material Specification (SDMS) specifies the minimum technical requirements for design, materials, manufacturing, testing, inspection and performance for low voltage distribution panels with Aluminum busbars, main circuit breaker and with/without outgoing MCCBs. to be used in the distribution network of the Saudi Electricity Company (SEC) in Saudi Arabia.

2. CROSS REFERENCES

This material standard specification shall be read in conjunction with SEC specification No.01-SDMS-01(latest revision), titled "General Requirements For All Equipment/Materials" which shall be considered as an integral part of this SDMS, also be read in conjunction with SEC purchase order requirements or contract schedules.

3. APPLICABLE CODES AND STANDARDS

The latest revision of the following codes and standards shall be applicable for the equipment/materials covered in this specification. In case of any deviation, the vendor/manufacturer may propose equipment/material conforming to an alternate code or standard without jeopardizing the requirements of this SDMS. However, the provision of SEC standard shall supersede the provision of these standards in case of any differences.

3.1	11-SDMS-01	1000V XLPE Insulated Unarmored Power Cables.
3.2	37-SDMS-02	Low Voltage Molded Case Circuit Breakers For low voltage distribution panels 400 Amps.
3.3	37-SDMS-04	Interface low voltage main circuit breaker.
3.4	50-SDMS-01	Current Transformers up to 36 KV.
3.5	38-SDMS-03	LV Digital Panel Meters.
3.6	31-SDMS-11	Specifications for Terminal Blocks for Primary Distribution Substations.
3.7	40-SDMS-02A	Specifications for Electronic Revenue CT And CT-VT Meter
3.8	DESP03	Protection system requirements for SEC distribution s/s.
3.9	IEC60529	Degrees of Protection Provided by Enclosures (IP Code).
3.10	IEC 60947-1	Low Voltage Switchgear and Control gear Part-1 General Rules
3.11	IEC 60947-2	Low Voltage Switchgear and Control gear Part-2 Circuit Breakers
3.12	IEC 61439-1	Low Voltage Switchgear and Control gear assemblies. Part-1 General Rules.
3.13	IEC 61439-6	Low Voltage Switchgear and Control gear assemblies. Part-6 Bus bar trunking systems (busways).
3.14	IEC 60114	Recommendations for Heat-Treated Aluminum Busbar material of the Aluminum-Magnesium-Silicon Type.
3.15	ASTM B236M	Standard Specification for Aluminum Bars for Electrical Purposes (Bus bars) Metric.
3.16	ASTM D1535	Standard Practice for Specifying Color by the Munsell System.
3.17	ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus.

3.18	ASTM D3359	Standard Test Methods for Measuring Adhesion by Tape Test.
3.19	ASTM A153	Standard Specification for Zinc Coating (hot-dip) on Iron and Steel Hardware.
3.20	ASTM B317	Standard Specification for Aluminum Bars for Electrical Purposes (Bus bars).
3.21	ASTM B 221	Standard Specification for Aluminum alloy extruded bus.

4. DESIGN AND CONSTRUCTION REQUIREMENTS

4.1 General:

4.1.1 The panel shall be supplied in two types for indoors and outdoors use, which contains incoming transformer connections, Aluminum bus bars, instruments panel, main circuit breakers according to panel's rating, 400A molded case circuit breakers (MCCB) for out-going circuits, neutral bus bar, earthing terminals, and the provision for generator connections.

4.1.2 All cable terminations shall be easily accessible from the front.

4.1.3 All insulating materials shall be non-hygroscopic and resistant to tracking and cracking.

4.1.4 Panel completes with all its fittings and attachments shall be capable of withstanding the effects of direct solar radiation at their installed locations. The temperature of metal surfaces exposed to direct solar radiation shall be regarded as 75° C, plus the effect of any internal heating.

4.1.5 Thermal inter-action shall not unduly affect the performance of any components.

4.1.6 All parts of equal size and shape shall be interchangeable. The general design shall be made with minimum number of joints.

4.1.7 All connections inside the panel shall have a minimum clearance which shall not be less than 25.4 mm between phase and ground as per NEMA standards. In case the above clearance cannot be obtained, adequate insulating material shall be provided.

4.1.8 All bolts & nuts shall be installed in a way that they could not be unbolted from outside the panel. Extra length of fasteners shall be avoided.

4.1.9 LVDP shall be equipped to install the smart meter in the site. Dimension of meter installation location shall comply with smart meter specification 40-SDMS-02A latest revision, meter installation location shall be on the internal door for the cabinet with fixed labels should be provided from both side internal and external on the internal door.

4.1.10 A special terminal block for the smart meter shall be provided as specified in clause 4.8 of this specification.

4.2 Incoming Transformer Connections:

4.2.1 For unit substations, incoming transformer connections shall be through main circuit breakers according to panel's rating then to L.V. bus bars. Removable Aluminum links shall be provided to enable the disconnection of incoming transformer bus bar connection from the main circuit breakers.

4.2.2 For stand-alone L.V. Panels they shall permit the use of single core aluminum cable of the size 800 mm² with compression bi-metallic lugs as per SEC specification No. 12-SDMS-02 (latest revision). These lugs will be supplied by SEC. M10x70 mm bolts with nuts and washers shall be provided. Number of incoming cables shall be as specified as in Table-1.1 and Table 1.2 of this specification.

4.3 Busbars:

4.3.1 The Bus bars shall be high conductivity Aluminum alloy. The bus bars shall be tin coated and uniform cross section as per ASTM B221 or approved equivalent.

4.3.2 The cross-sectional area of bus bars shall be as per Table-1.1 and Table 1.2 of this specification.

4.3.3 All bolted electrical joints shall be secured by corrosion proof steel fasteners. All bolts, nuts, washers and studs shall be galvanized and comply with SEC specification No. 01-SDMS-01 (latest revision).

4.3.4 Two insulating steel cover plates, each equipped with a window, which shall be UV resistant, unbreakable, transparent, minimum 3 mm thick, heat resistant, non-hygroscopic and polycarbonate door. The cover shall be casketed /hinged and fitted with locking bar to secure them at the center. Stain less steel hinges shall be welded Hinges shall be fitted by bolts made from stainless steel or brass.

4.3.5 Adequate removable and insulating barrier between the operator and the live bus bars shall be provided.

4.3.6 All bus bars shall be fully insulated with heat-shrink insulation tubes. Main incoming bus bar shall be sequence marked in colour from right to left (RED, YELLOW, BLUE) and (BLACK) for the neutral busbar, Phase bus bars shall be sequence marked in colour from front to back (RED, YELLOW, BLUE) and (BLACK) for the neutral busbar, bus bar links for branches MCCBs shall be sequence marked in colour from front to back (RED, YELLOW, BLUE).all this colour marking should be by a coloured heat shrink tube as described above.

4.3.7 Heat-shrink insulation tubes shall provide insulation enhancement and protection against flashover and accidentally induced discharge with long term reliability even at high continuous operating temperatures. Heat-shrink insulation tubes shall be extremely durable, resists damage from solvents, ultraviolet light, weathering, mechanical impact and general wear, Flame

retardant and non-halogen-based material reduces flammability and the toxic and corrosive effects in fire situations

4.3.8 Bus bars shall be spaced and staggered in such a way that installation of MCCBs and associated cables can be achieved without any difficulty using common tool.

4.3.9 Phase bus bars shall have the provision to accommodate SEC approved CTs as per SEC specification No. 50-SDMS-01 (latest revision) for the ratios given in Table-1.1 and Table 1.2.

4.3.10 CTs which are installed on the Bus bars, secondary wiring circuits shall be protected by a proper way by using a channel or adduct and not interfering with any other wiring, all wiring shall comply with DES-P03.

4.4 Generator Connection:

Holes of 13mm diameter for installation of mobile generator shall be provided. The distance between each two holes shall be 50mm center to center. The holes shall be suitable for lugs provided by SEC, two (2) for L.V. Panel up to 1600A rating and four (4) for L.V. Panel exceeding 1600A.

4.5 Neutral Busbar:

The size of neutral bus bar shall be as per Table-1.1 and Table 1.2 of this specification. It shall be connected to the frame by insulated bolts, easily removable link. Holes of 13mm diameter shall be provided for each outgoing cable connection (lug type).

4.6 Current Transformer:

Three Current Transformers conforming to SEC specification No. 50-SDMS-01 shall be installed at the incoming bus bars of the distribution panel for metering purpose. CT secondary neutral terminals shall be earthed. The current rating is indicated in Table-1.1 and Table 1.2 of this specification, Insulation Class-E and 120^{o}c, the installed CT shall be from approved SEC vendor list, all secondary wiring for the CT circuit should be protected by a proper way by using a channel or adduct, to protect the wiring start from the bus bar until the amusement panel. And not interfering with any other wiring, all circuit shall be complying with DES-P03.

4.7 Digital Panel Meter

L.V. panel shall be equipped with a digital panel meter according to SEC specification No. 38-SDMS-03 (latest revision) and supplied from SEC approved manufacture; CT ratio shall be preprogrammed by panel manufacturer. All voltage wiring shall be protected by a 3 pole MCB with a prober rating, any burnout fuse will be accepted.

4.8 Smart Meter Wiring Provision:

4.8.1 The LVDP panel shall be ready to install a smart meter in the site.

4.8.2 All internal wiring must be complied with the latest revision for the protection requirements DES-P03 for CT and voltage circuits.

4.8.3 Smart meter wiring shall be sequence marked in colour (Red, yellow, blue and black for neutral).

4.8.4 Provision of CT terminal blocks and voltage terminal blocks from approved SEC vendor.

4.8.5 CT terminal blocks shall have the facility of shorting and isolate.

4.8.6 CT circuit shall comply with DES-P03.

4.8.7 Voltage circuit shall be protected with a 3 pole MCB, 10 A and comply with DES-P03 requirements, the CT terminal blocks shall be delivered in short position for all phases with neutral and ground (single ground point for the current loop).

4.9 Main Breaker:

SEC approved main incoming breaker (MCCB/ACB) as per SEC specification No. 37-SDMS-04 (latest revision) shall be provided.

4.10 Outgoing MCCBs (for LVDP with Main CB + MCCBs):

4.10.1 Provision for installation of 400A MCCBs according to SEC specification No. 37-SDMS-02 latest revision shall be already made for each outgoing feeder and also suitable for installing at least five (5) SEC approved MCCBs. Unless otherwise specified in the tender, number of MCCBs supplied/installed in the L.V. Panel shall be (n – 2) where n is the no. of outgoing MCCBs in Table-1.1 and Table 1.2. However minimum number shall be 2 MCCBs.

4.10.2 MCCB outgoing terminals shall be suitable for direct connection of 300mm² Al. cable as per SEC specification No. 11-SDMS-01 (latest revision) by means of bimetallic lugs with M10 bolt and palm width of 30mm. as per Figure No. 5 of SEC specification No.12-SDMS-02

4.10.3 One Mechanical Link to connect two nearby MCCBs in parallel shall be provided with each panel. It shall be as per attached drawing.

4.10.4 These MCCBs shall comply with the following:

- Easily interchangeable with at least five (5) SEC approved manufacturers.
- Without lock and without terminal spreaders.
- With current limiting functions.

4.11 Outgoing Connections (for LVDP with Main CB only)

Outgoing connection to consumer shall be made by means of connecting 630 mm² copper cables to the main bus bars by using cable lugs according to SEC specification number 12-SDMS-02 (latest revision).

Components	TRANSFORMER RATING					
	500 kVA		1000 kVA		1500 kVA	
	230/133V	400/230 V	230/133V	400/230 V	230/133V	400/230 V
L.V. Panel incoming bus bar/link rating (A) minimum	1600	800	3000	1600	4000	2500
CT rating on incoming bus bars (A)	1500/5	800/5	3000/5	1500/5	4000/5	3000/5
Incoming cables for standalone L.V panel	2/ph 1/N	2/ph 1/N	4/ph 2/N	2/ph 1/N	6/ph 3N/	4/ph 2/N
For L.V. panel used in unit sub-stations	Incoming connection shall be through removable Aluminum busbar links from back of the panel					
Main C.B Rating (A)	1600	800	3000	1600	4000	2500
Number of Outgoing MCCB's	8	4	12	8	14	10
Minimum Spacing MCCB's	Not less than 10 mm					
Phase Bus bars min. cross section (mm²)	2x10x80	1x10x80	3x10x100	2x10x80	3x15x100	3x10x100
Phase Bus bars min. Rating, (A)	1600	800	3000	1600	4000	2500
Neutral Bus bar min. Size (mm²)	1x10x80	1x5x80	2x10x100	1x10x80	2x15x100	1x15x100
Neutral Bus bar min. Rating, (A)	800	400	1600	1000	2500	1600
LV DIGITAL PANEL METER	As per specification No. 38-SDMS-03 latest edition					
Symmetrical Short Circuit Rating for 2 sec. (RMS), kA	25	25	40	25	65	40

Table 1.1: Dual Voltage Distribution Panel

Notes:

A) The above table is applicable for all ratings of Unit Substations.
B) The Stand-alone L.V panel designs shall be rated by current as indicated in the table as:
- **(I)** 1600A L.V. panel to be used for 500kVA (230/133V) and 1000kVA (400/230V) transformer ratings,
- **(II)** 3000A L.V. Panel to be used for 1000kVA (230/133V), 1500kVA (400/230V) transformer ratings,
- **(III)** 4000 A L.V. Panel to be used for 1500 kVA (230/133V) transformer rating.

(IV) System voltage measurement shall be provided in the metering panel to ensure the voltage rating for LV panels rated 230/133 V and to be used for 400/230V in future. LV Panels designed to be used in Unit substation dual LV Transformers shall be designed for LV ratings of 230/133 V.

(V) The rating of main circuit breaker in both LVDPs (with branches and without branches) shall be according to bus bar rating.

Components	TRANSFORMER RATING		
	500 kVA	1000 kVA	1500 kVA
	400/230 V		
Panel incoming bus bar/link min. rating (A)	800	1600	2500
CT rating on incoming bus bars (A)	800/5	1500/5	3000/5
Incoming cables to be connected per phase for standalone panel	1cable 1cx630 mm²or 800mm2 aluminum	2cables 1cx630mm² or 800mm2 aluminum	3cables 1cx630mm² or 800mm2 aluminum
Incoming cables to be connected to neutral for standalone panel	1cable 1cx630mm² or 800mm2 aluminum	1cable 1cx630mm² or 800mm2 aluminum	2cables 1cx630mm² or 800mm2 aluminum
For panel used in U/S	Incoming connection shall be through removable Aluminum bus bar links from back of the panel		
Main C.B Rating (A)	800	1600	2500
Number of Outgoing MCCB's	4	8	10
Outgoing MCCB's Rating (A)	400	400	400
Minimum Spacing MCCB's	Not less than 10mm		
Phase Bus bars min. cross section (mm²)	1x10x80	2x10x80	3x10x100
Phase Bus bars min. Rating, (A)	800	1600	2500
Neutral Bus bar min. Size (mm²)	1x5x80	1x10x80	1x15x100
Neutral Bus bar min. Rating, (A)	400	1000	1600
Symmetrical Short Circuit Rating for 1 sec. (RMS), kA	25	25	25

Table 1.2: Single Voltage Distribution Panel

Notes:

A) The above table is applicable for all ratings of Unit substations.

B) The Stand-alone L.V panel designs shall be rated by current as indicated in the table as:

(I) 800 A L.V. panel to be used for 500kVA (400/231V) transformer rating,

(II) 1600 A L.V. panel to be used for 1000kVA (400/231V) transformer rating,

(III) 2500 A LV panel to be used for 1500 kVA (400/231V) transformer rating.

4.12 Grounding:

4.12.1 Two terminals having M12 stud with nuts and washers made of stainless steel shall be provided on enclosure of the panel with clear identified grounding mark. The marking shall be done by indelible paint, sticker is not acceptable.

4.12.2 Two nos. removable links between neutral bus bar and panel body with 70² mm bare copper conductor shall be provided.

4.12.3 All hinged parts shall be connected to the frame work (enclosure) through minimum 35mm² bolted copper braids for main doors and 16 mm² for sub panels.

4.13 Internal Lighting:

The L.V. Panel shall be fitted with a 10-Watt LED lamp controlled by the door's operated switch. The auxiliary circuit supplying the lamp shall have a separate miniature circuit breaker located at an accessible position on the metering panel.

4.14 Auxiliary Supply and metering panel.

4.14.1 A pre-wired terminal block for 3 phases, 4-wire connections shall be installed inside the metering panel. The terminals size shall be suitable for 10mm² standard wiring from approved SEC vendor list. 10A miniature circuit breakers shall be provided in the circuit.

4.14.2 The L.V. Panel shall be equipped with a 230V three pin socket outlet on the metering panel, completed with plug top and labeled with the appropriate voltage. The position of the socket outlet shall not impede cable installation or termination. Wiring shall be done by 4mm² copper, 85ºC black PVC insulation with crimping type connectors.

4.14.3 All using internal wiring should be from approved SEC vendor list.

4.14.4 All voltage circuit shall be protected by MCB with a suitable ampere sizing up to the connected load separately as mention in the scheme of the metering panel.

4.14.5 The wiring scheme and SLD for the metering panel shall be approved from the concerned dept.

4.14.6 All TB arrangement shall be touch protected, and follow the requirements for the DES-P03.

4.14.7 CT circuit shall be complying with DES-P03, and the wiring should be color coded with phase sequence (red, yellow, blue and black).

4.14.8 Voltage measurement circuit will follow the requirements for the VT circuit on the specifications DES-P03, also color coded for phase sequence (red, yellow, blue and black).

4.14.9 A copy from the panel wiring SLD and scheme shall be attached inside the cabinet of metering panel in a safe way, or make it as a striker inside the cabinet, including all the instructions and cautions.

4.14.10 All wiring shall be with a standard marking and with a phenol, to be easy to trace for future troubleshooting if any.

4.14.11 All CT wiring using ring type lugs, and TB matched with it.

4.14.12 All secondary wiring from LV bus bar for voltage and currant to the metering panel shall be through a protective way like a duct or channel.

4.14.13 All MCB and TB shall be with standard labels, no labels fix on the MCB direct will be accepted.

4.14.14 A future used location on the internal panel door for the smart meter with indicated labels should be provided from both side internal and external on the front internal door., the dimension of the location shall be complying with the smart meter specification 40-SDMS-02A latest revision, this location shall be covered with acrylic glass.

4.15 L.V. Outgoing Cable Support:

4.15.1 Cable support wooden / pre-molded clamps shall be provided and fixed above L.V. Panel's base frame just below cable break-out position. They shall be adequate to support the cable in normal service and when subjected to short circuit tests per attached drawing in page No. 22 and 24.

4.15.2 L.V. Panel's base frame cover shall be fabricated in two half plate, each plate is divided into three sections for easy installation and removal of outgoing cables. Sealable cable entry holes shall be provided.

4.15.3 Adequate vertical clearance of 500mm for phases, 400mm for neutral above cable clamps and horizontal spacing shall be provided to permit connection of the phase conductors on MCCB terminals, irrespective of their formation. All L.V. Cables shall be terminated from front in a horizontal plane at one level and clamped inside L.V. Panel.

4.15.4 Access to the L.V. Cables Termination shall be made from the front by means of gasketed/hinged doors fitted with locking bar to secure them at the center. Hinges shall be fitted by bolts made from stainless steel or brass.

4.16 Labels:

4.16.1 Each outgoing circuit shall be provided with three layers trifoliate label plate (white/black/white) of 3mm thickness, dimension of 30mm x 80mm, bolted and blank (non-numbered).

4.16.2 These label plates shall be fixed above the MCCB in suitable place not on the MCCB.

4.16.3 The outgoing cable feeder no. plate of steel sheet size at least A4 shall be provided. The printed table on the left door inner side shall also be acceptable.

4.16.4 All labels should be fixed by screws, no any stickers labels will be accepted.

4.17 Enclosure:

The enclosure shall be designed as follows:

4.17.1 Weather proof and provided with watershed top. Enclosure shall be made of galvanized steel sheet at least 3mm thickness or Aluzinc at least 2 mm thickness.

4.17.2 Adequate ventilation shall be provided by means of canopy, louver….etc. to allow natural circulation of air. Ventilation shall be suitable screened to prevent the entry of insects and foreign bodies. Screen material shall be made of strong enough stainless steel. Degree of protection shall be IP 54, IEC 60529 for Outdoor and Indoor applications respectively.

4.17.3 For stand-alone L.V. Panels, enclosure shall be suitable for mounting on a flat base at ground level. Holes shall be provided for fixing M16 size foundation bolts.

4.17.4 Access to the L.V. outdoor panel shall from front by means of doors with gasket and steel hinges duly welded, and pad locking arrangement shall be through stainless steel hasp assembly as shown in Figure 1 and Figure 2 and as mentioned below.

i) Doors shall be fitted through three stainless steel welded hinges.
ii) Pressure fit type gasket or extruded type gasket shall be provided. Glue fit type is not acceptable.

4.17.5 All doors shall be provided with door stoppers and locking at open position to protect them from swinging in order to avoid accidents.

4.17.6 The panel shall be fitted with lifting lugs on both side at the top, and located such that the unit is balanced when lifted.

4.17.7 Insertion Pocket for circuit number plate, any instruction manuals and wiring circuit diagram shall be provided in the left side of the panel's door.

4.18 Finishing Color:

4.18.1 The enclosure shall be adequately protected against corrosion and painted and the color shall be RAL 7035 or as per SEC specification No. 01-SDMS-01 (Last Revision).

4.18.2 SEC item number and secondary voltage shall be marked/printed by indelible paint on the front of the panel's door.

4.19 Dimensions:

LVDP Rating	Length (mm)	Width (mm)	Height (mm)
800 A	1800	650	1900
1600 A	2000	650	1900
2500 A	2500	650	1900

Table 2.1: Maximum overall dimensions for stand-alone Single L.V. Panel

LVDP Rating	Length (mm)	Width (mm)	Height (mm)
1600 A	1800	650	1900
3000 A	2000	650	1900
4000 A	2500	650	1900

Table 2.2: Maximum overall dimensions for stand-alone Single L.V. Panel

5. NAME PLATE:

Each panel shall be provided with an aluminum name plate fixed inside on left door bearing the following information engraved on it with minimum in Arabic and in English:

- Reference to SEC specification
- Rated voltage (V)
- Rated current of bus bar (A)
- Rated current of incoming unit (A).
- Rated current of outgoing unit (A).
- Short circuit current rating (kA)
- CT Ratio installed.
- Bus Bar Material: Aluminum
- SEC purchase order number
- SEC item number
- Manufacturer's / Vendor's name
- Year of manufacture
- Gross weight when fully equipped (kg)
- Serial number

6. MONOGRAM & DANGER PLATES:

Danger plate and SEC monogram as per SEC drawing Nos. SEC-01-01 and fig. 49A of SEC specification No. 20-SDMS-02 respectively shall be provided and installed at the front (on SEC approved location) of the L.V panel using M5 stainless steel (oval head rounded neck bolts with nuts and external tooth lock washers) not removable/accessible from the front, that is, without opening the door/front cover.
SEC shall approve location and samples of danger and monogram plates prior the installation.

7. TESTING:

Panels shall be tested in accordance with the latest standards and as specified herein. All test results shall be provided for review and acceptance by SEC.

7.1 Type (Design) Test:

7.1.1 Short Circuit Test:

The panel shall be capable of carrying the short circuit current (RMS, Symmetrical) for two (2) seconds as per Table-1.1 and Table 1.2 above.

7.1.2 Temperature Rise Test:

a) Temperature rise test shall be conducted as per IEC 61439-1.

b) Temperature rise test at any point shall not exceed 60˚C relevant to the maximum ambient temperature as specified in SEC specification No. 01-SDMS-01 for LVDP with branch breakers.

c) c) For Instruments inside the panel, the temperature rise shall not exceed the allowable temperature of the instruments.

7.1.3 Salt Spray Test and Tape (Scratch) Test shall be as given in SEC specification No. 01-SDMS-01.

7.1.4 Certified test reports of Design test performed on an identical unit shall be submitted to SEC for review and approval during bidding stage.

7.2 Routine Test:

7.2.1 All Routine Tests prescribed in the relevant IEC-60947 and IEC-61439 shall be performed on all units prior to delivery to SEC.

8. INSPECTION:

SEC may wish to witness tests or to visit factory during manufacture of any or all items covered in this specification. Accordingly, the supplier shall give an advanced notice to SEC of the manufacturing and testing schedule.

9. PACKING AND SHIPPING:

Packing and shipping shall generally be as per SEC General Requirements No. 01-SDMS-01 including the following:

a. The panel shall be delivered ready for service.

b. Supplier shall contact Materials Department of SEC for additional packing, handling and shipment instructions as applicable.

c. Packing crates shall be marked with following:
   - Manufacturer's name
   - Country of origin
   - SEC purchase order number
   - SEC item number
   - Gross weight in kilograms
   - Handling instructions
   - Final destination store
   - Bus bar material: Aluminum

10. GUARANTEE:

The vendor shall guarantee the panel against all defects arising out of faulty design or workmanship or defective materials for a period of **five (5)** years from the date of delivery.

11. SUBMITTALS:

11.1 The vendor shall fill and submit one copy of the attached Technical Data Schedule with the quotation. In addition to Data Schedule, clause by clause compliance to this specification shall also be confirmed/ submitted.

11.2 Detailed dimensional drawings of the panel, showing all mounting arrangements, terminals, electrical clearances between phase and earth, hinges, cable clamps, locking arrangement and name plate shall be submitted.

11.3 Single line diagram shall be submitted.

11.4 The supplier shall provide literature describing field experience under similar service conditions to those in section 4.0. A reference's sale list shall be included. This shall detail the quantities sold, name and address of the user, number of years in service, in each case.

11.5 A comprehensive list of manufacturer's recommended spare parts with full details (item description, part No., manufacturer name, supplier name …etc) shall be submitted separately

11.6 Catalogue that indicates the part No. of all the components inside the panel shall be submitted.

11.7 Detail drawing showing the installation of revenue metering CT as required in this specification.

12. DATA SCHEDULE:

Dual Low Voltage Distribution Panel
(Sheet 1 of 2)

SEC Inquiry No. _____ Item No. _____

Clause	DESCRIPTION	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
4.0	**DESIGN AND CONSTRUCTION REQUIREMENTS**		
4.1	**General**		
	Rated voltage	230/133V, ±5% 400/230V, ±5%	
	Symmetrical Short Circuit Rating for 2 seconds (RMS)	kA	
	Phase bus bar rating	(A)	
	Neutral bus bar rating	(A)	
4.1.8	Min. clearance between phases and phase to ground	25.4 mm	
4.2	**Incoming Transformer Connection**		
4.2.1	Removable copper links		
4.2.3	No. of incoming cables (for Stand-alone)	As per Table-1.1 and Table 1.2	
4.3	**Busbars**		
4.3.1	Material	Tinned Aluminum	
	Minimum thickness of tin plating	5% of nominal composition	
4.3.2	Size of phase bus bar		
4.3.3	Electrical joints (bolts, nuts, washers)	Plated as per SEC's Spec. No. 01-SDMS-01	
4.3.4	Insulating barrier to cover live parts	Yes	
4.3.5	Busbar color	Red/Yellow/Blue Black for neutral	
4.4	**Provision for generator connection**	Yes	
4.5	**Size of neutral bus bar**		
4.6	**Current Transformer :** Class Min. Burden Error co-efficient Insultions class Type and make	 0.5 10 VA < 5 Class E-120°C	

Table 3: Technical Data Schedule 1.

Dual Low Voltage Distribution Panel
(Sheet 2 of 2)

SEC Inquiry No. _____ Item No. _____

Clause	DESCRIPTION	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
4.7	**Digital Panel Meter** Type, Model & Make		
4.8	**Smart meter Wiring Provision**	**40-SDMS-02A** (latest Revision)	
4.9	**Main Circuit Breaker** Type, Model & Make Rated current	800 A 1600 A 2500 A 3000 A 4000 A	
4.10	**Outgoing MCCB's:** Type, Model & Make Rated current Dimensions(L x W x D) mm No. of supplied MCCBs No. of provisions for fixing MCCB's	400 A	
4.11	**Grounding :** Two terminals of M12 stud Copper braid for hinged parts	Yes 35mm²	
4.12	**Internal Lighting**	10W	
4.13	**Auxiliary Supply:**		
4.14	**L.V. Cable Supports**		
4.15	**Labels**		
4.16	**Enclosure:** Material Thickness of sheet Degree of protection Type of gasket Locking arrangement Finishing color	Steel sheet/Aluzinc 3mm/2mm IP54 Pressure fit clause 4.17.4 As per RAL 7035	
4.17	**Dimensions L x W x H (mm)** **(for Stand-alone L.V. panel)**		
6.0	**MONOGRAM & DANGER PLATES**	Yes	

Table 4: Technical Data Schedule 2

Single Low Voltage Distribution Panel
(Sheet 1 of 2)

SEC Inquiry No. _____ Item No. _____

Clause	DESCRIPTION	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
4.0	**DESIGN AND CONSTRUCTION REQUIREMENTS**		
4.1	**General**		
	Rated voltage	400/231V, ±5%	
	Symmetrical Short Circuit Rating for 1 seconds (RMS)	kA	
	Phase bus bar rating	(A)	
	Neutral bus bar rating	(A)	
4.1.8	Min. clearance between phases and phase to ground	25.4 mm	
4.2	**Incoming Transformer Connection**		
4.2.1	Removable copper links		
4.2.3	No. of incoming cables (for Stand-alone)	As per Table-1.1 and Table 1.2	
4.3	**Busbars**		
4.3.1	Material	Tinned Aluminum	
	Minimum thickness of tin plating	5% of nominal composition	
4.3.2	Size of phase bus bar		
4.3.3	Electrical joints (bolts, nuts, washers)	Plated as per SEC's Spec. No. 01-SDMS-01	
4.3.4	Insulating barrier to cover live parts	Yes	
4.3.5	Busbar color	Red/Yellow/Blue Black for neutral	
4.4	**Provision for generator connection**	Yes	
4.5	**Size of neutral bus bar**		
4.6	**Current Transformer :** Class Min. Burden Error co-efficient Insultions class Type and make	 0.5 10 VA < 5 Class E-120ºC	

Table 3: Technical Data Schedule 3.

Single Low Voltage Distribution Panel
(Sheet 2 of 2)

SEC Inquiry No. _____ Item No. _____

Clause	DESCRIPTION	SEC SPECIFIED VALUES	VENDOR PROPOSED VALUES
4.7	**Digital Panel Meter** Type, Model & Make		
4.8	**Smart meter Wiring Provision**		
4.9	**Main Circuit Breaker** Type, Model & Make Rated current	800 A 1600 A 2500 A	
4.10	**Outgoing MCCB's:** Type, Model & Make Rated current Dimensions(L x W x D) mm No. of supplied MCCBs No. of provisions for fixing MCCB's	400 A	
4.11	**Grounding:** Two terminals of M12 stud Copper braid for hinged parts	Yes 35mm²	
4.12	**Internal Lighting**	10W LED	
4.13	**Auxiliary Supply:**		
4.14	**L.V. Cable Supports**		
4.15	**Labels**		
4.16	**Enclosure:** Material Thickness of sheet Degree of protection Type of gasket Locking arrangement Finishing color	Steel sheet/Aluzinc 3mm/2mm IP54 Pressure fit clause 4.17.4 As per RAL 7035	
4.17	**Dimensions L x W x H (mm)** **(for Stand-alone L.V. panel)**		
6.0	**MONOGRAM & DANGER PLATES**	Yes	

Table 4: Technical Data Schedule 4.

Single /Dual low voltage Distribution Panel
(Sheet 1 of 1)

SEC Inquiry No. _____ Item No. _____

A. Additional technical information or features specified by SEC:

B. Additional supplementary data or features proposed by vendor/supplier:

C. Other particulars to be filled up by vendor/supplier:
(use separate sheet if needed)

Address	Manufacturer	Vendor/Supplier
Name of Company		
Location and Office Address		
Authorized Name and Signature		
Date		
Official seal / stamp		

Table 5: Technical Data Schedule 5.

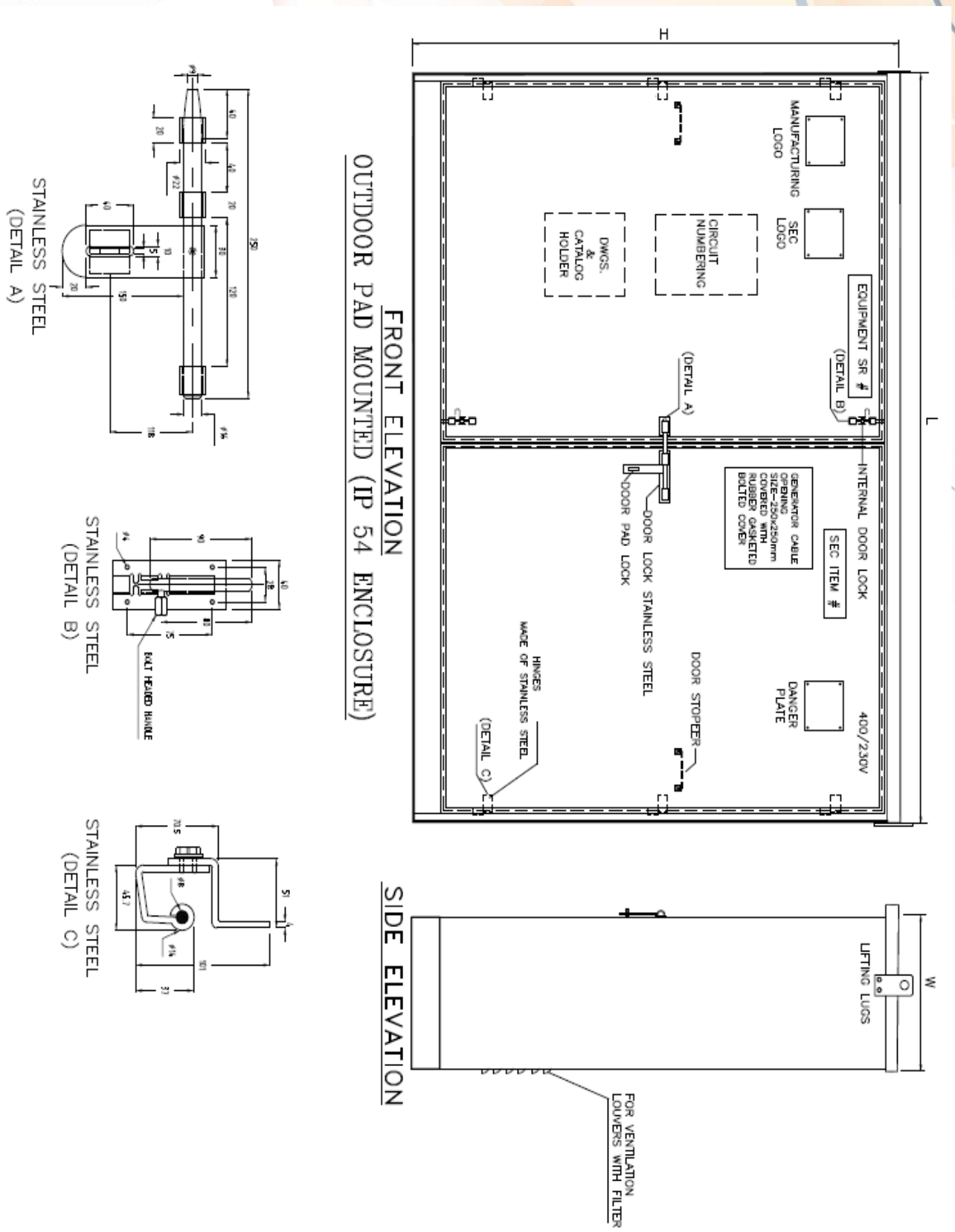

Figure 1: Front View and side view elevation

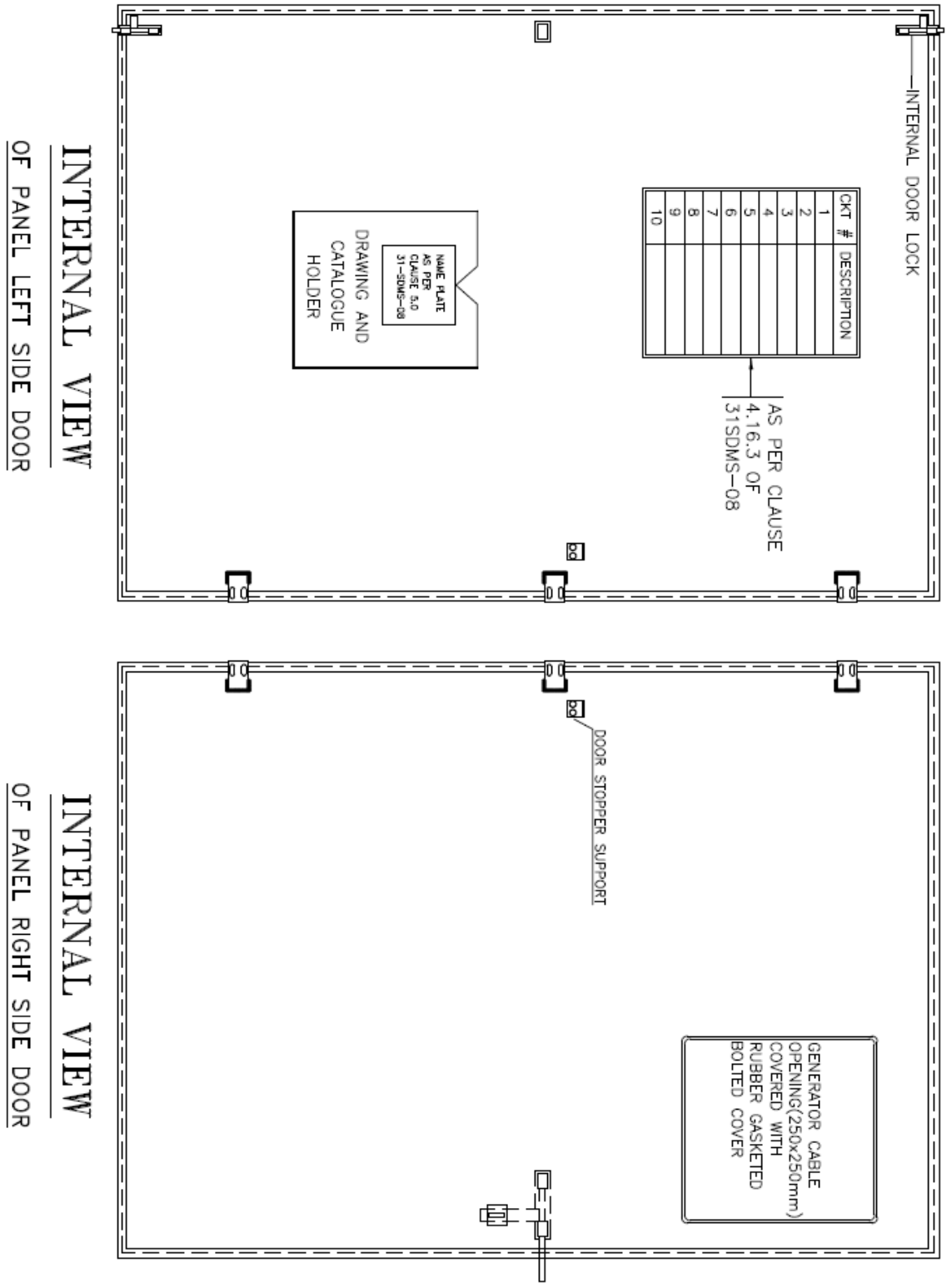

Figure 2: Door Details-internal view

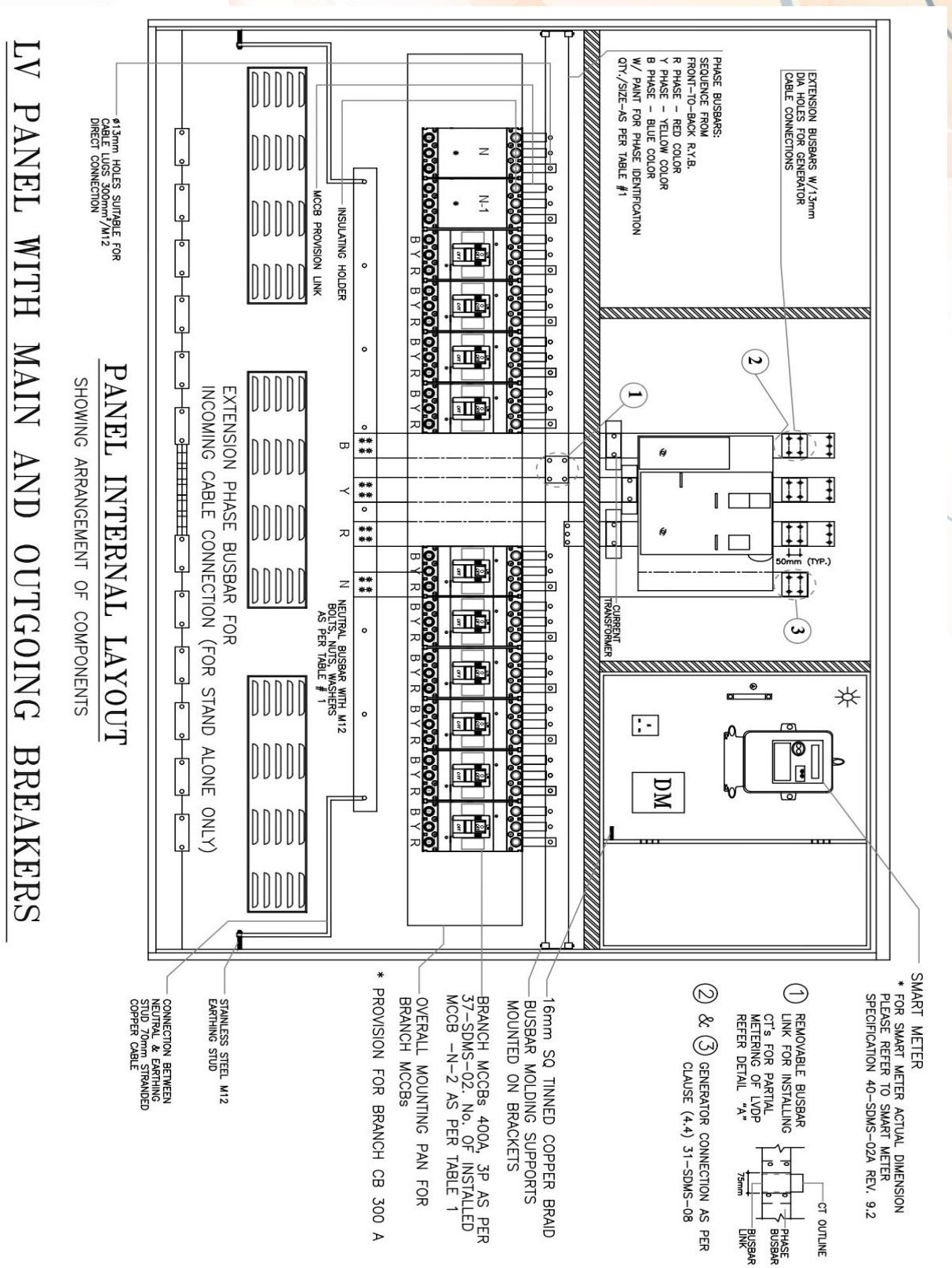

Figure 3: Panel with (MCB+MCCBs) Internal Layout

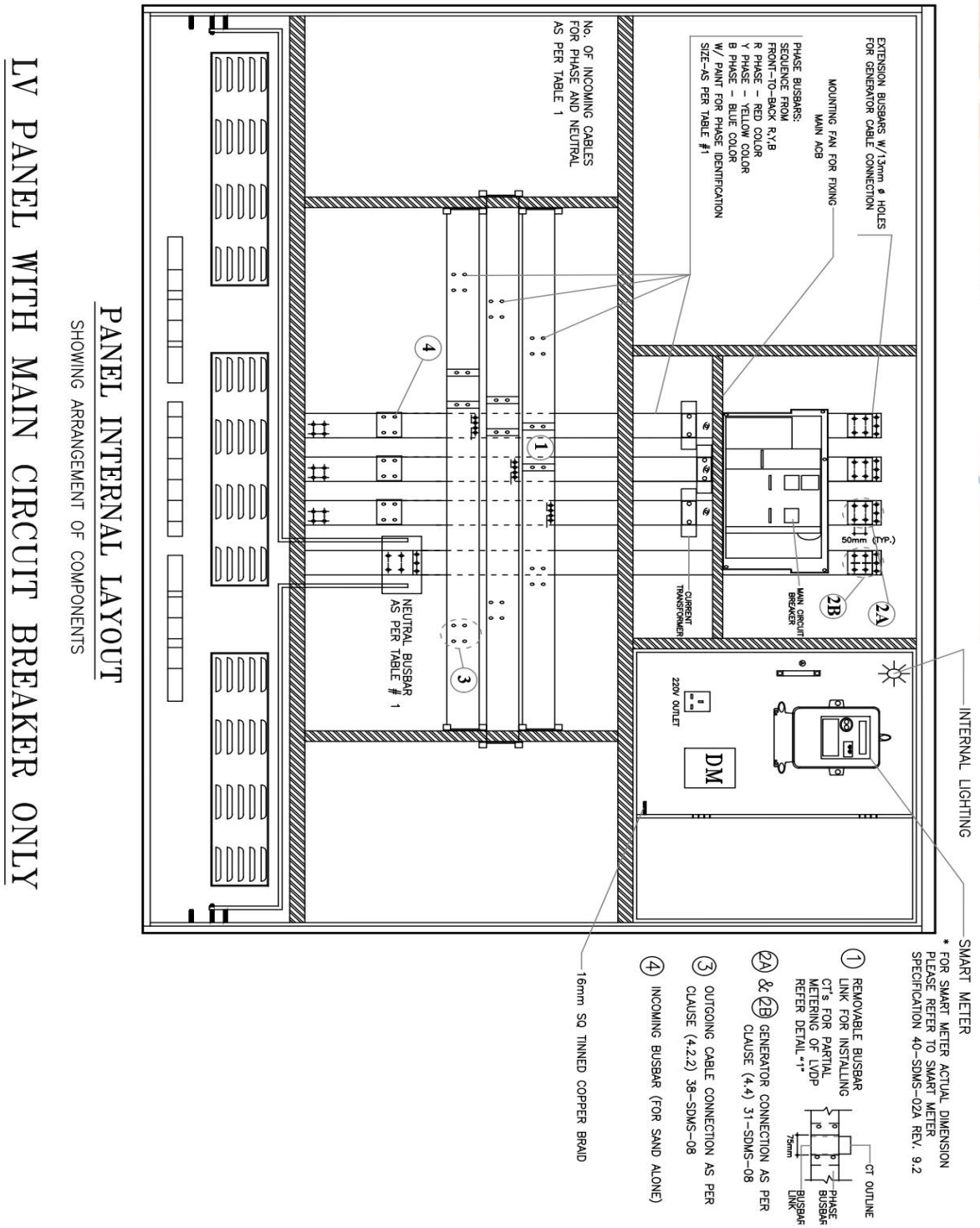

Figure 4: Panel with (MCB) Internal Layout

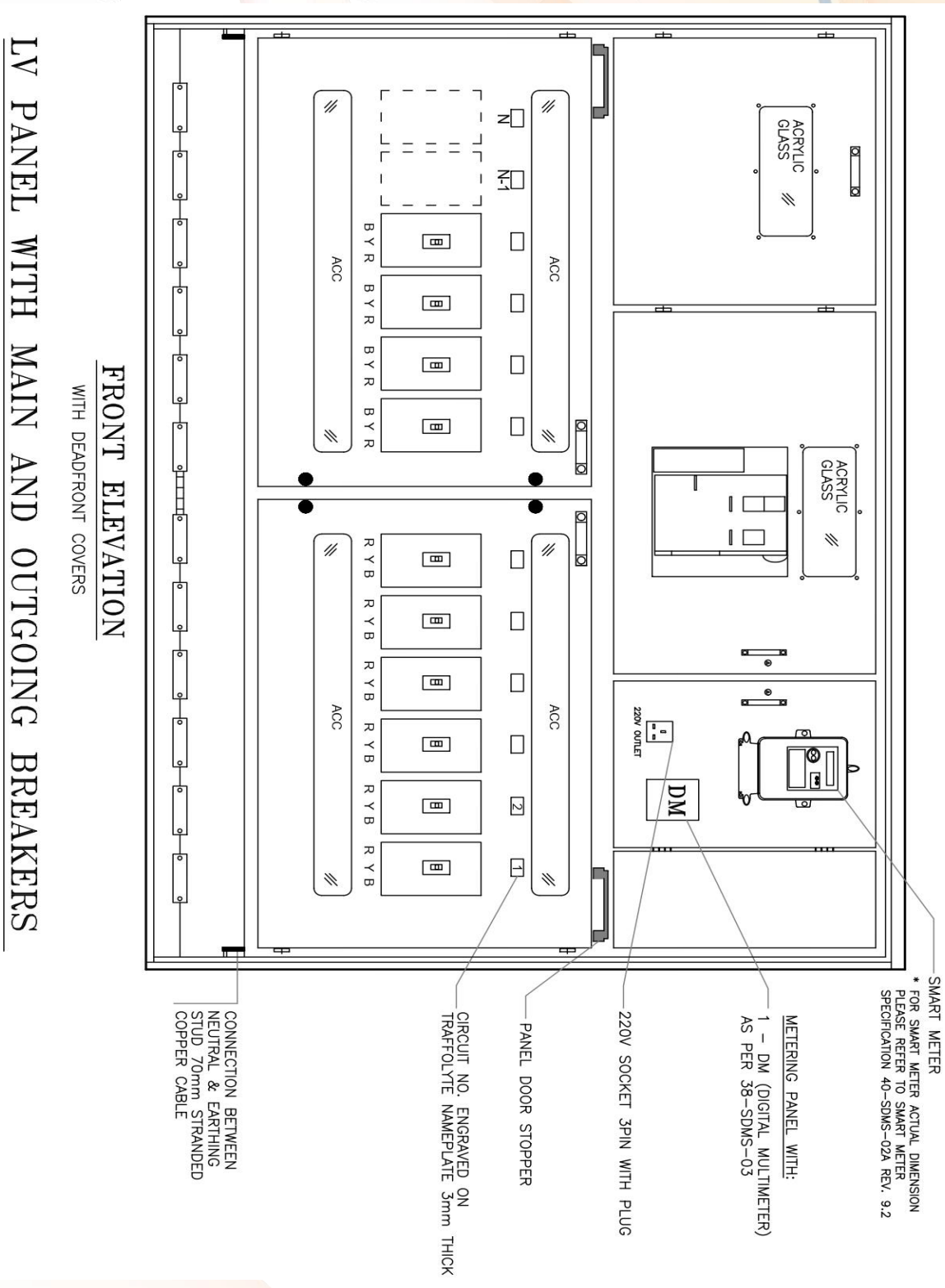

Figure 5: Panel with (MCB+MCCBs) front elevation

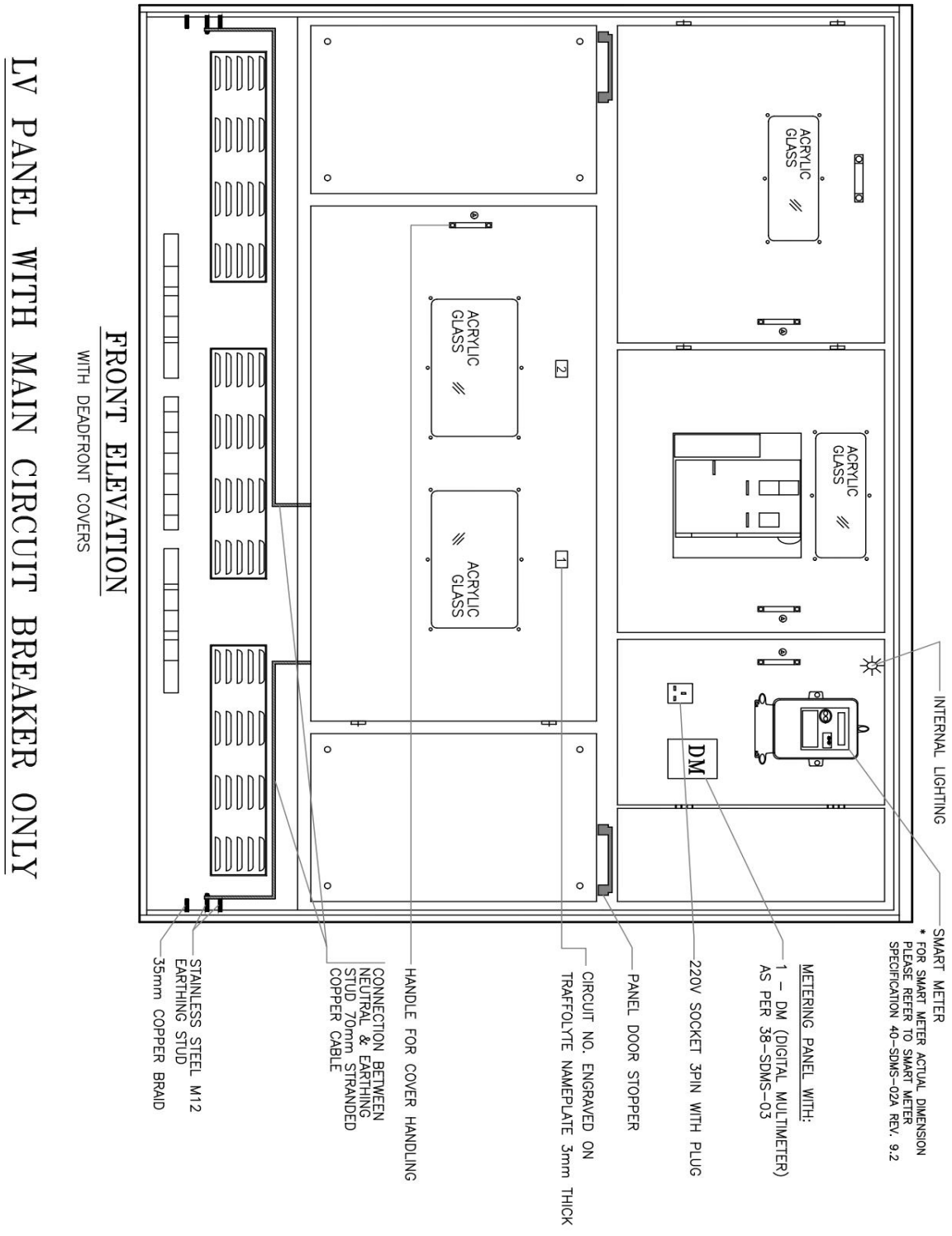

Figure 6: Panel with (MCB) front elevation

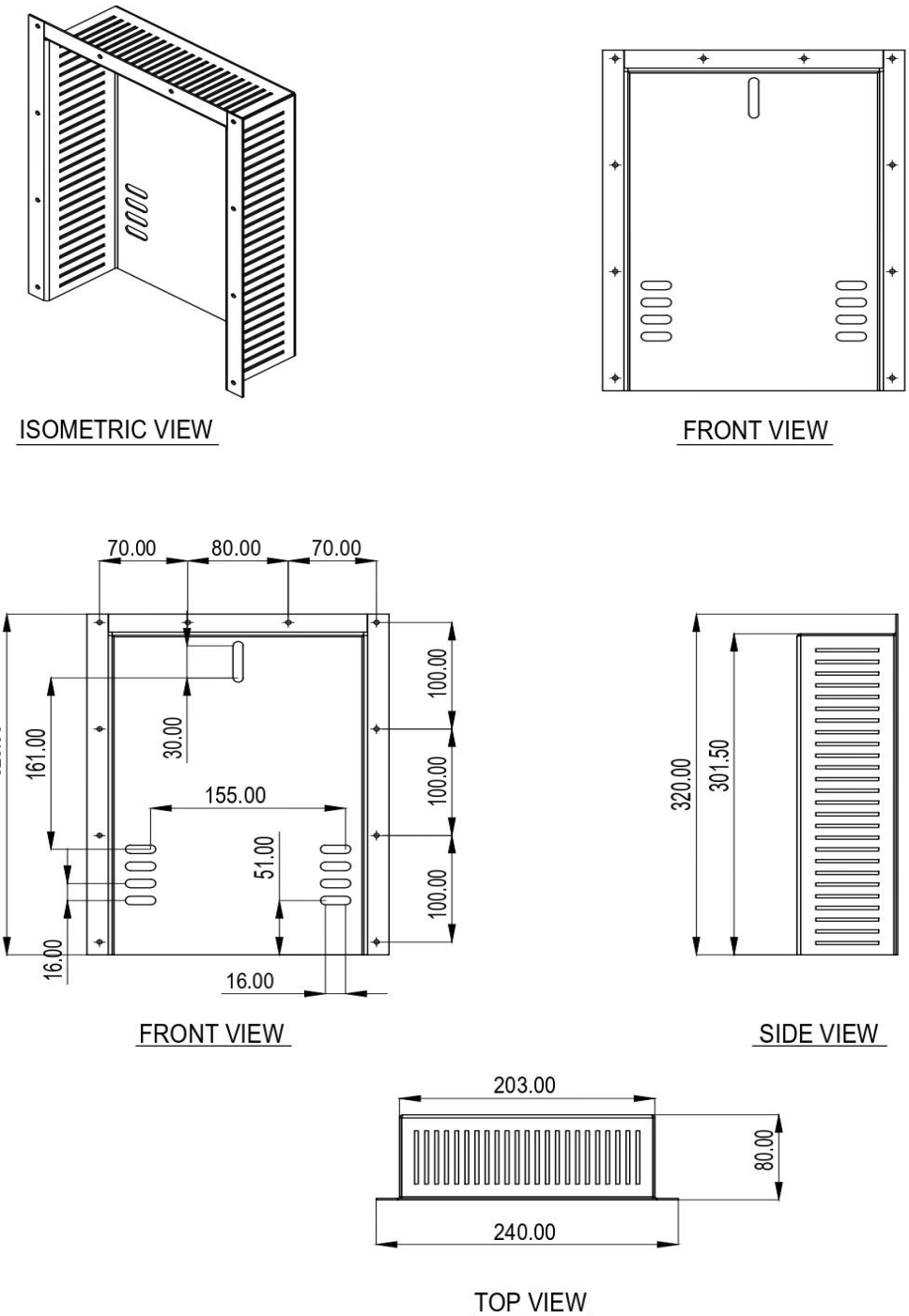

Figure 7: Smart Meter Provision Details & Dimension.

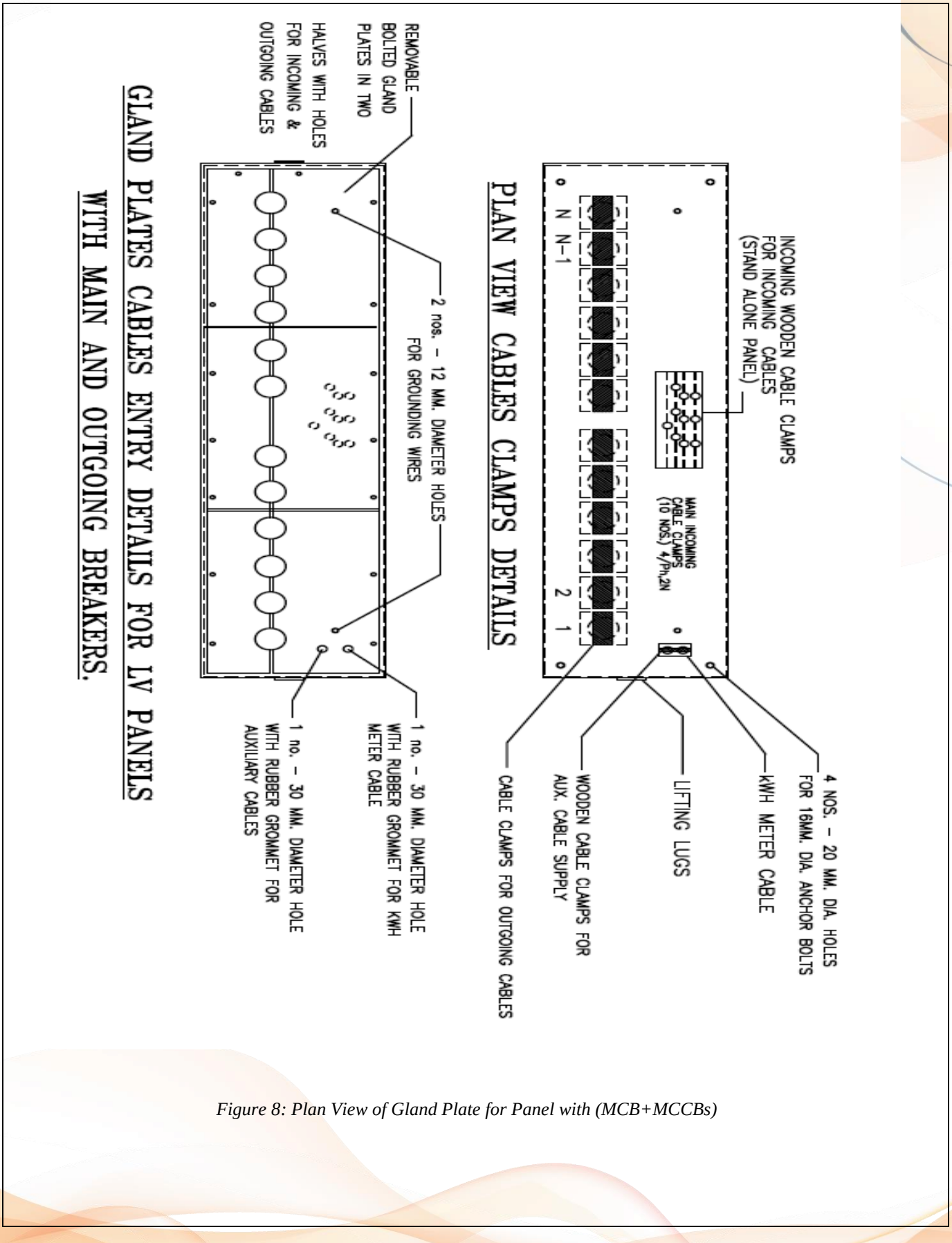

Figure 8: Plan View of Gland Plate for Panel with (MCB+MCCBs)

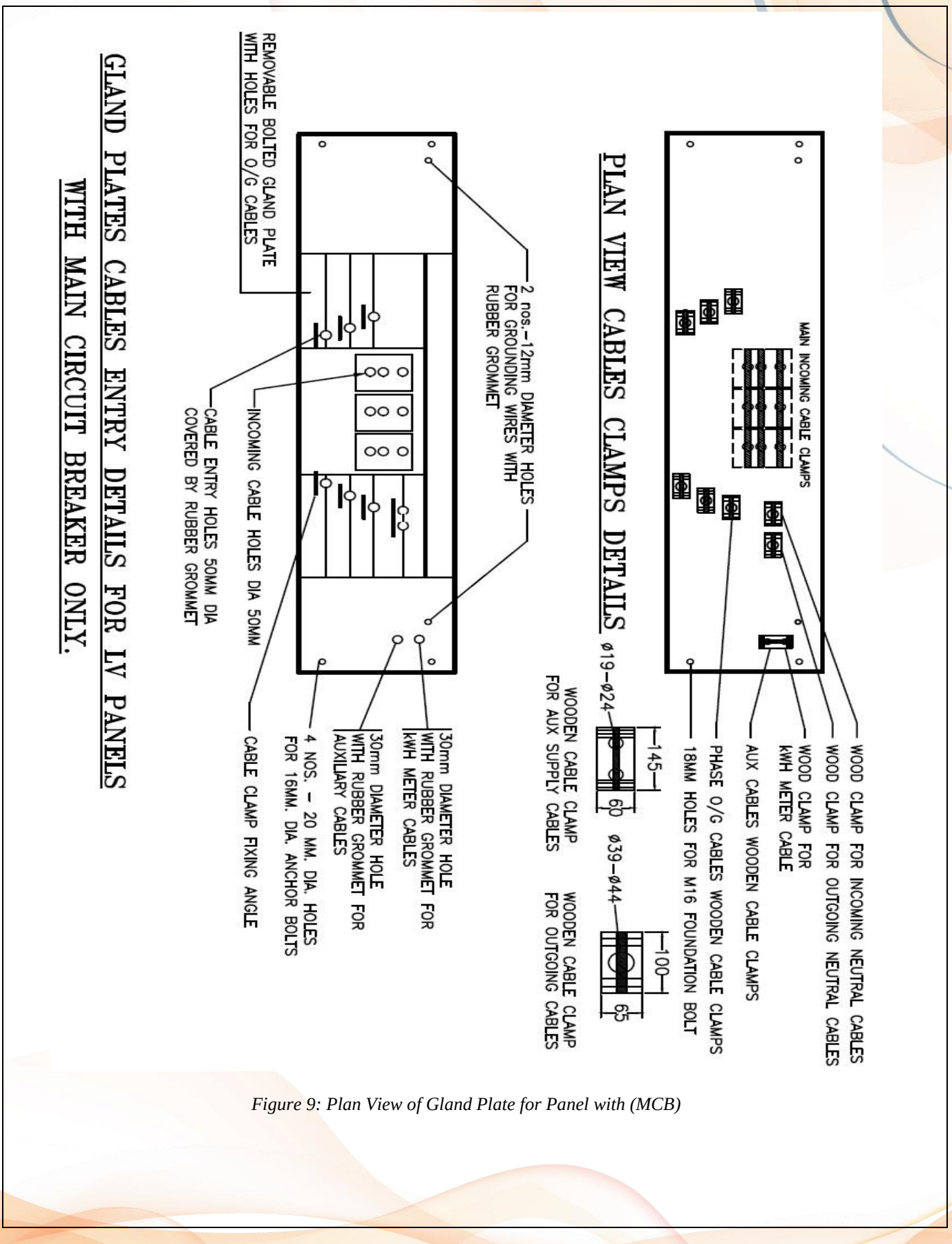

Figure 9: Plan View of Gland Plate for Panel with (MCB)

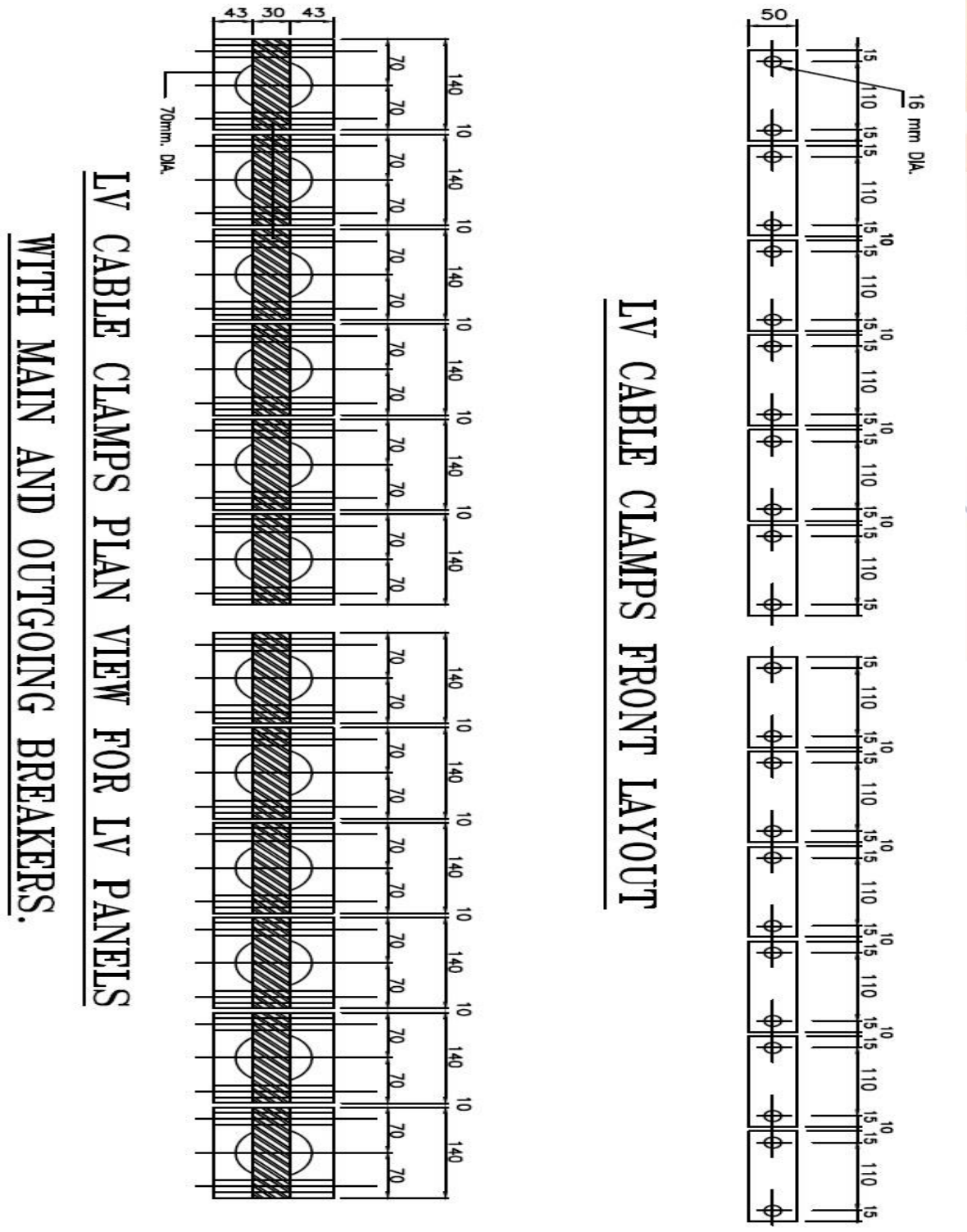

Figure 10: Low voltage cables clamps for Panel with (MCB+MCCBs)

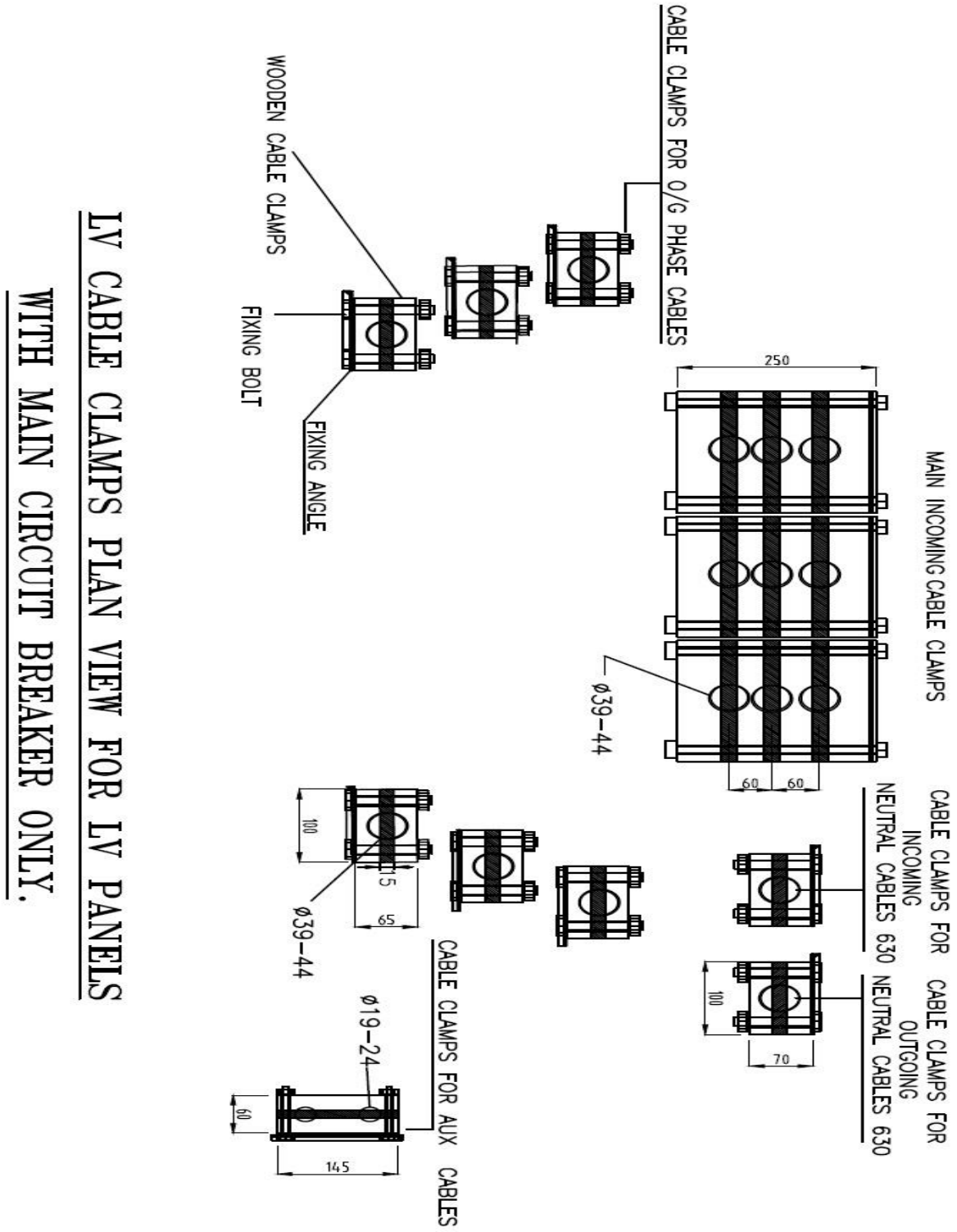

Figure 11: Low voltage cables clamps for Panel with (MCB+MCCBs)

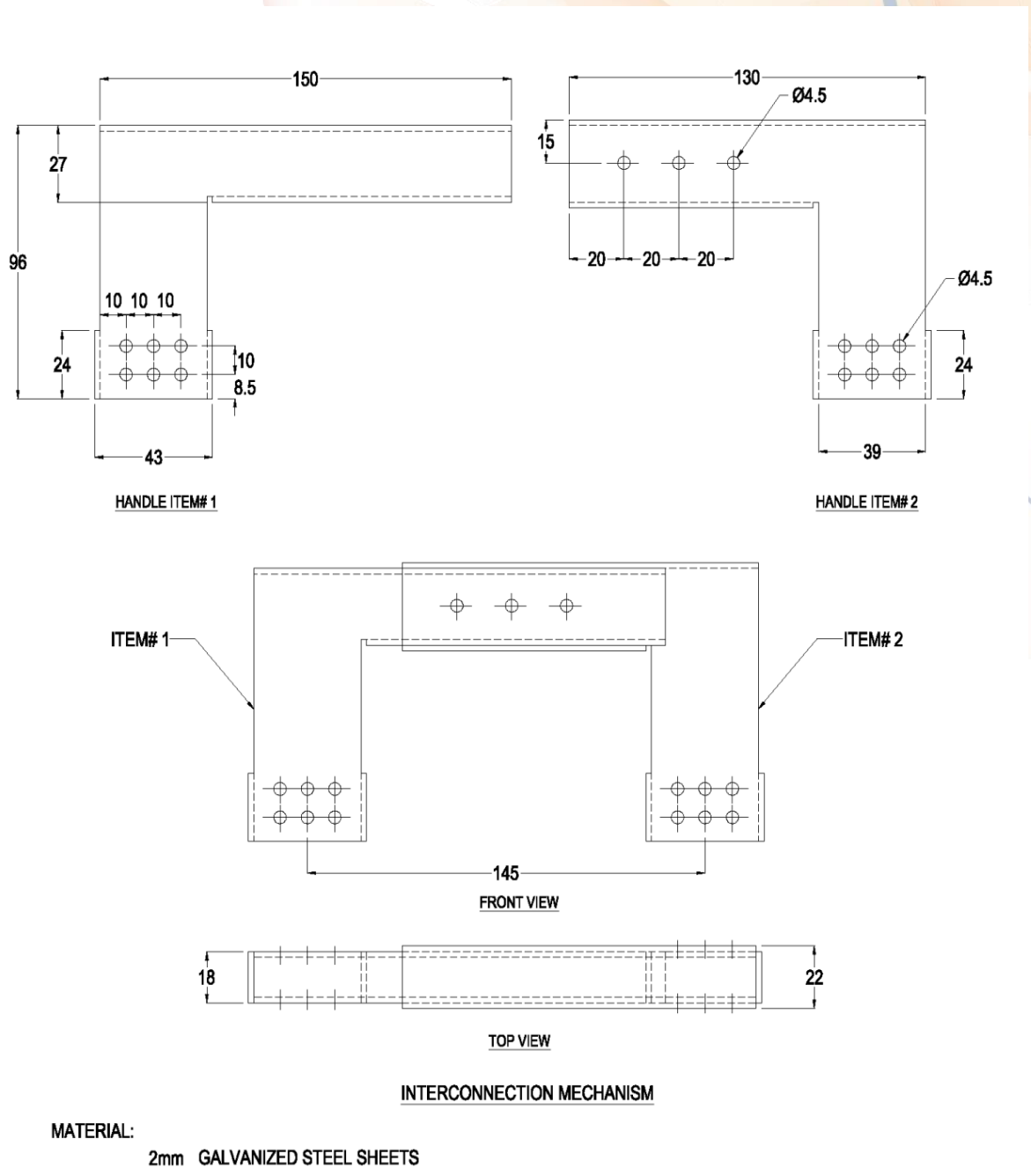

Figure 12: Handle For Two Interconnected Breakers

CIRCUIT NUMBER	D E S C R I P T I O N
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

NOTE

TABLE SIZE SHALL BE PROPORTIONAL TO THE INSIDE OF THE LEFT SIDE DOOR OF THE PANEL

Figure 13: Circuit Label