



PACKAGE SUB-STATIONS UP TO 33 KV



**FOR SAFE, RELIABLE AND SPACE SAVING
POWER DISTRIBUTION SOLUTIONS**



M Electrical & Engineering Sdn Bhd

TECHNICAL SPECIFICATIONS

ABOUT US

M Electrical & Engineering Sdn Bhd is a company in manufacturing, supplying and servicing of all kind of electrical equipment and apparatus, as well as power distribution products and solutions.

Our principal activities are fabrication, supply, subcontracting, modification and servicing all kinds of switchboards and electrical panels from standard to custom made to meet customer's needs. Besides in house facilities of machining and fabrication, we are also specialized in switchboards and panels assembly, wiring works and even inspection and testing along with our experienced team.

PACKAGE SUB-STATIONS AT GLANCE

M Electrical & Engineering package substations are available up to 33kV. The fully equipped package substation, included of Outdoor Enclosure, MV Switchgear, Distribution Transformer and LV Switchgear. The factory assembled self contained package substation is a complete weather proof solution. It only requires to connect incoming and outgoing cables and this makes the site infrastructure work involved is an absolute minimum.

It is a ready to position solution, provided with four lifting eyes located on the base for ease of lifting, positioning and placement on a concrete base with the help of crane.

Each substation consists of three main equipment: Medium Voltage Switchgear, Distribution Transformer and Low Voltage Switchgear. All the equipment are packed in a separate compartment and accessible individually using the respective compartment door.

PRODUCT SPECIFICATION

NO	DESCRIPTION	SPECIFICATION
01	SHEET METAL	
	A) TREATMENT	HOT ROLLED / ELECTRO GALVANISED STEEL SHEET
	B) THICKNESS	
	(I) STRUCTURE & DOOR	2MM / 2.5MM / 3MM
	(II) ROOF & WALL	2MM / 3MM
02	PAINTING/COATING	
	A) FINISHING	EPOXY POWDER (OUTDOOR)
	B) THICKNESS	MIN. 60 MICRON
	C) COLOUR/CODE	AS PER CLIENT'S REQUESTED
	D) BASE FRAME	PAINTED BLACK / HOT DIPPED GALVERNIZED
03	BASE FRAME	C CHANNEL / UNIVERSAL COLUMN
04	FLOORING	ALUMINIUM / STEEL / CHEQUERED PLATE
05	DEGREE OF PROTECTION	IP33 / IP34 / IP43 / IP44 / IP53 / IP54 / IP55
06	CABLE ENTRY	
	A) INCOMING	BOTTOM
	B) OUTGOING	BOTTOM
07	CONSTRUCTION	FLOOR STANDING / WITH RAISED-UP FRAME
08	INSTALLATION	OUTDOOR



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COMPONENTS SPECIFICATIONS

ENCLOSURE

Enclosure outdoor body is made of sheet steel in ventilated / corrugated type design for proper heat dissipation. The enclosure is painted with epoxy-based powder paint and is suitable for outdoor installations. The compartments are provided with separate doors and pad locking arrangements. Each compartment is fitted with door operated lamp for illuminated purpose. For safety purpose, the transformer compartment doors are fitted with arc reflectors.



ELECTRICAL HOUSE (E-HOUSE)

Electrical Houses (also known as “E-House” or “Integrated Power Assembly”) is a prefabricated walk-in modular outdoor enclosure to house a medium voltage (MV) and low voltage (LV) switchgear as well as auxiliary equipment. It is ready to operate in the field with minimum installation, commissioning and start up time – as an alternative to traditional on-site building construction (concrete block, brick construction or similar).



MEDIUM VOLTAGE SWITCHGEAR

Switchgear compartment is equipped with MV / VCB Panel / Ring Main Unit which can be characterized by their type of insulation: air, oil and gas. The switch used to isolate the transformer can be a fusible switch, or may be a circuit breaker using vacuum or gas-insulated interrupters. The unit may also include protective relays to operate the circuit breaker on a fault.



DISTRIBUTION TRANSFORMER

The distribution transformer is equipped with professionally designed ventilation openings for air flow to keep transformer cool. The compartment is provided with a pressure relief system integrated in the ceiling. An optional floor mesh is also provided to restrict the entry of small animals and other foreign objects. The compartment can accommodate both Oil immersed and Dry type transformers.





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COMPONENTS SPECIFICATIONS

LOW VOLTAGE SWITCHBOARD

The LV compartment contains Low voltage distribution board which is fed from the secondary side of transformer. M Electrical & Engineering's Low Voltage Distribution Board can be designed in different arrangements and configurations in order to suit any required application. Proper Busbars are provided for the phases and neutral, suitable to the transformer secondary voltage and current ratings. A ground bus linked to the neutral bus is also provided.

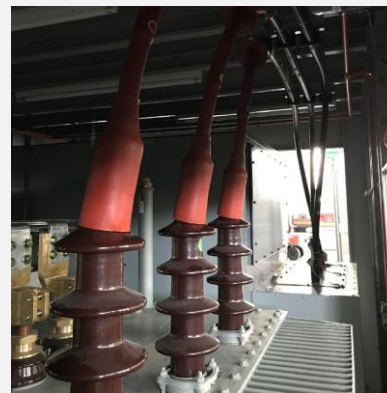
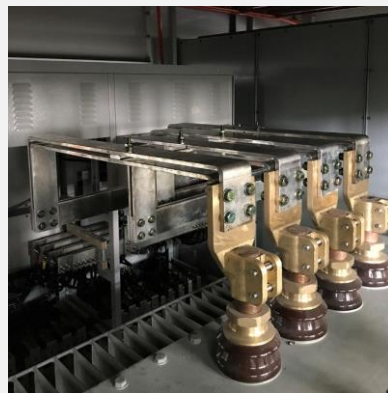
The following equipment can be accommodated inside the panel:

1. Air circuit breakers (ACB's)
2. Moulded case circuit breakers (MCCB's)
3. LV Fuse switches / Fuse ways
4. Protection overcurrent / Earth Fault Relay
5. Instrumentation and metering
6. Street lightning systems



CONNECTION BETWEEN EQUIPMENT

Personnel and equipment safety is the major concern. In order to ensure complete safety of equipment used in a package sub-station, especially the transformer bushings, the connection between the transformer and the RMU is made with XLPE insulated cables with Right Angle / Inline Cable Boot. The connection between the transformer and Low Voltage Distribution Boards is terminated with cable / insulated copper busbar.



**OPTIONAL FEATURES

- Tariff metering for Medium Voltage Switchgear in a separate compartment
- Automatic Power Factor Correction Panel on Low Voltage side
- Equipped with Air Conditioning System
- Smoke detector and fire alarm system for transformer compartment
- Motor operation of Low Voltage and Medium Voltage equipment for SCADA connectivity.
- Special enclosure colour options for outdoor package sub-stations.
- Touch-proof plug-in MV terminations for transformers



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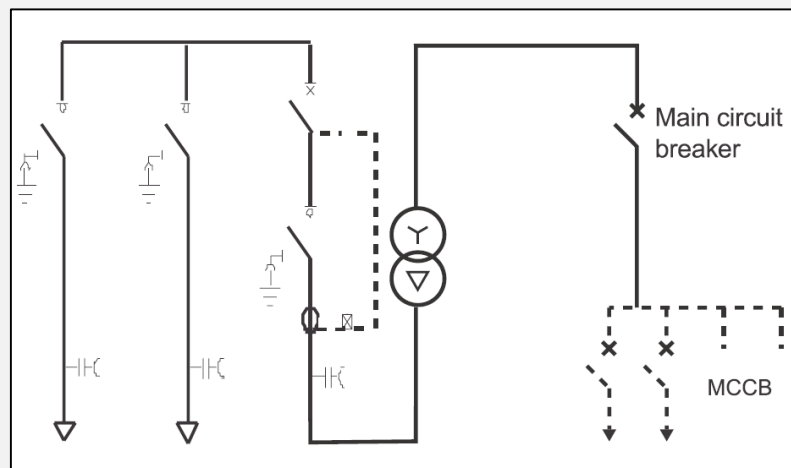
CONSTRUCTION DETAILS

CONFIGURATIONS OF PACKAGE SUB-STATIONS

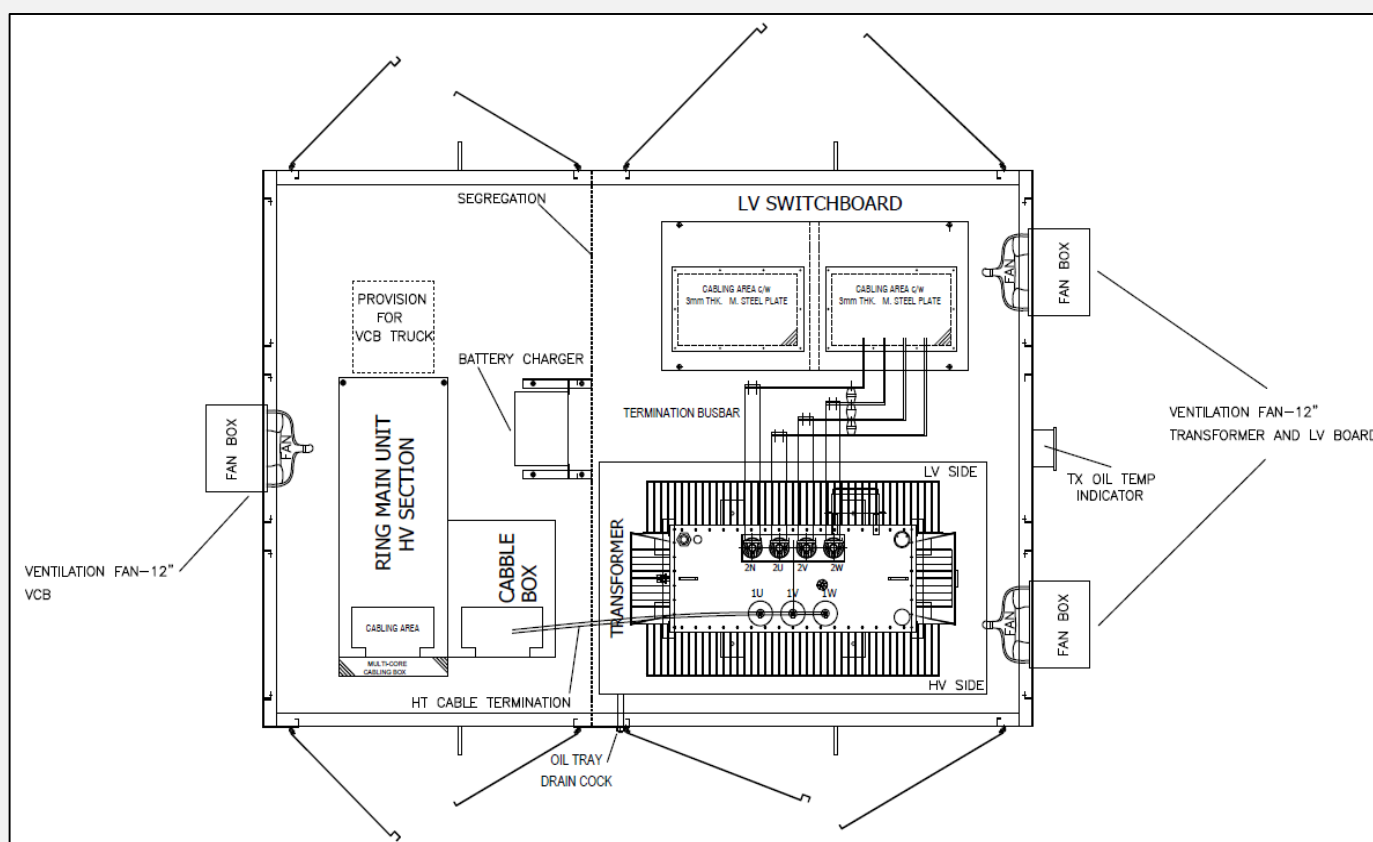
The enclosure of the outdoor package sub-stations is manufactured using high quality sheet steel. This provides high resistance to corrosion, which is paramount in outdoor applications. Package Sub-Stations is typically divided into three compartments which are Ring Main Unit, Distribution Transformer and Low Voltage Switchgear.

The dimensions for the enclosure's wall units, roof and doors are constructed based on the dimensions of space required. Different dimensions space of required has different dimensions for the package sub-stations and thus different arrangement for the Ring Main Unit, Distribution Transformer and Low Voltage Switchgear.

TYPICAL SINGLE LINE DIAGRAM OF PACKAGE SUB-STATIONS



TYPICAL CONFIGURATIONS OF PACKAGE SUB-STATIONS AND E-HOUSE



PROJECT: 1MW SOLAR FARM, RND HILL (11KV)

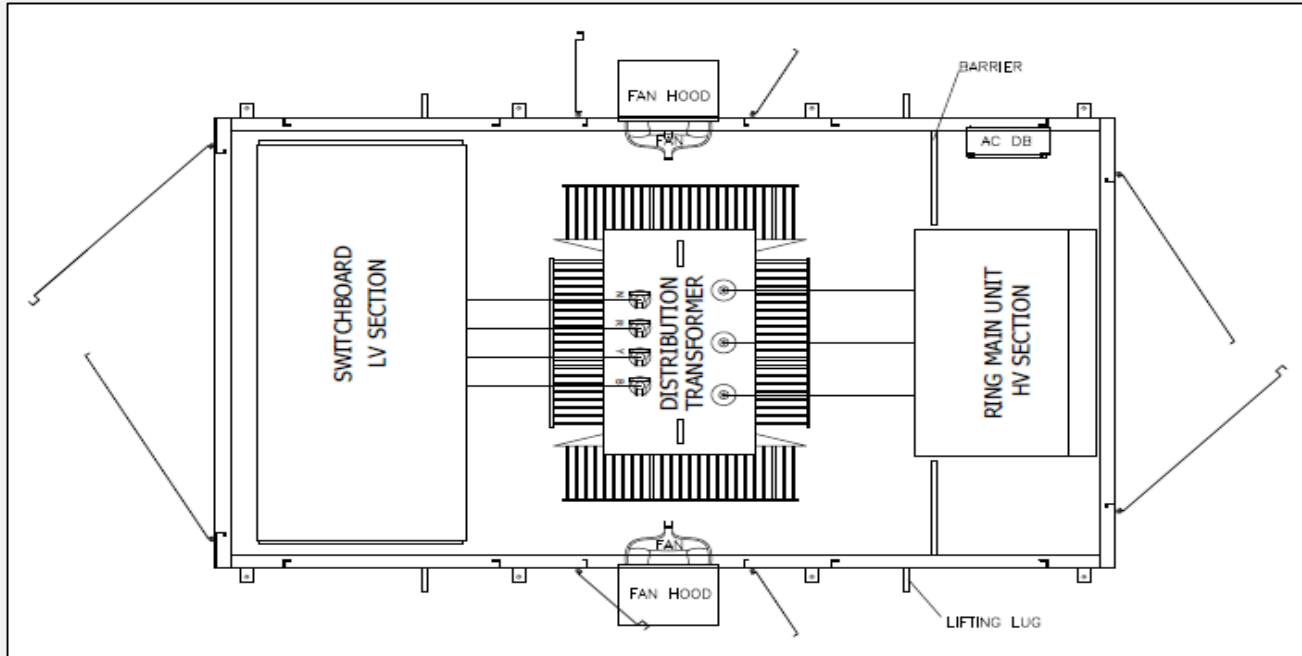
TRANSFORMER RATING: 1250KVA



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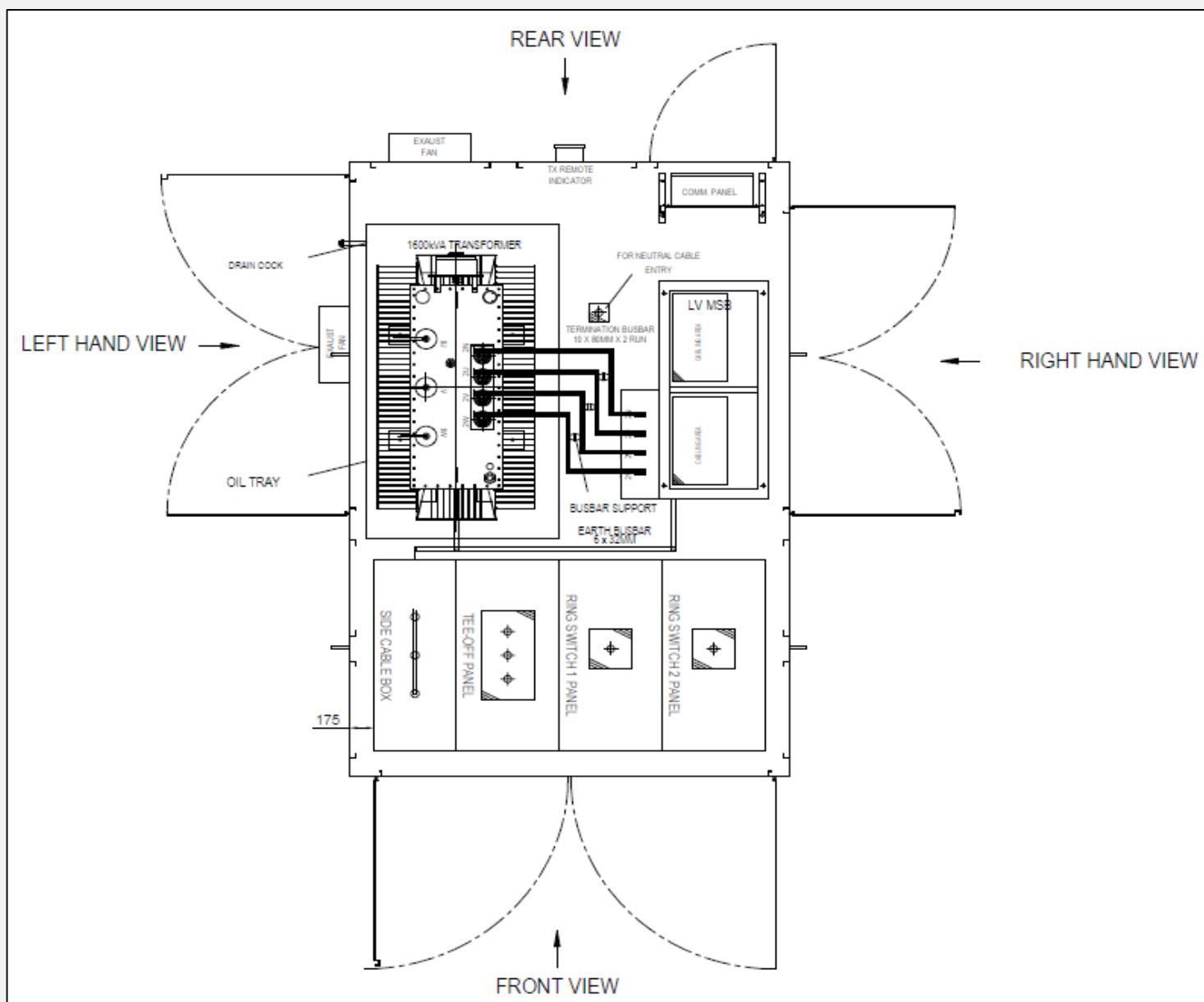
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CONSTRUCTION DETAILS



PROJECT: OJI GSPP TEMPORARY POWER SUPPLY (11KV)

TRANSFORMER RATING: 1000KVA



PROJECT: 30MW AC SOLAR PLANT GEBENG, PAHANG (33KV)

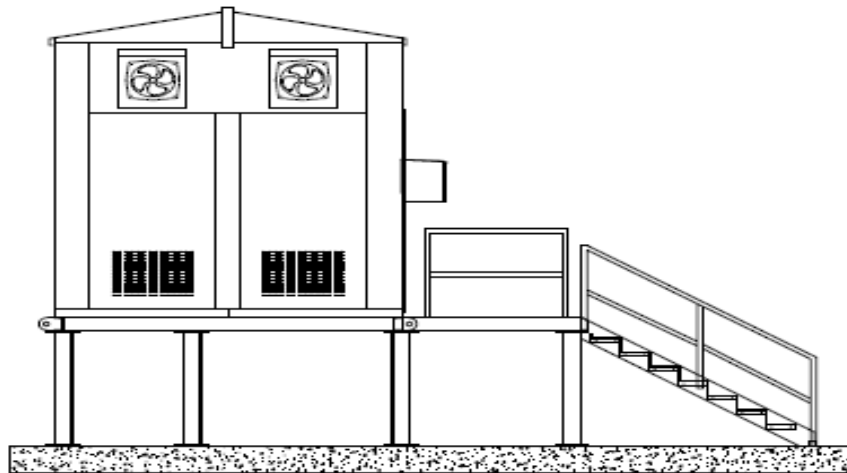
TRANSFORMER RATING: 1250KVA, 1600KVA



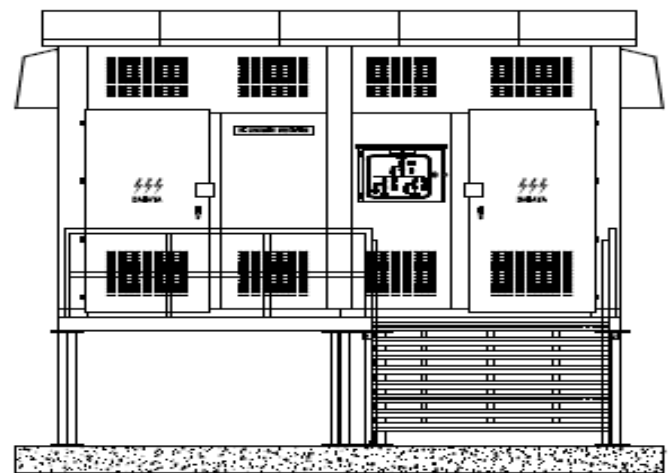
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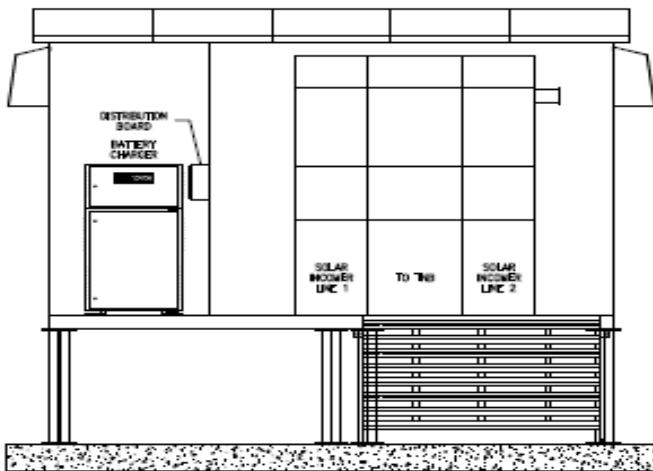
CONSTRUCTION DETAILS



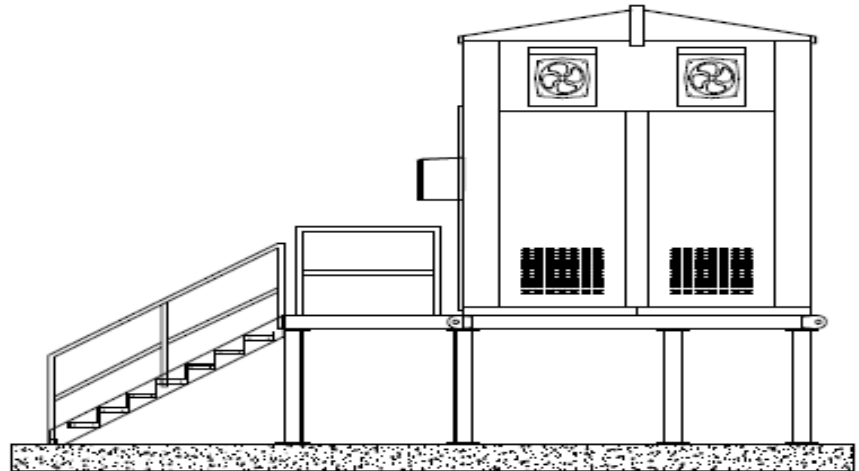
LEFT HAND VIEW



EXTERNAL FRONT VIEW



INTERNAL FRONT VIEW



RIGHT HAND VIEW

PROJECT: 20MW LARGE SCALE SOLAR FARM BATU KAWAN, PULAU PINANG (33KV)

PAINTING

Enclosure is painted with epoxy-based powder paint (colour – Light Aircraft Grey 8204).

Advantages:

- Aesthetic, glossy finish
- Outdoor durability
- Resistant to corrosion
- Resistant to chemicals and stains

VENTILATION

Ventilation is achieved by installing the exhaust fan inside the enclosure. Sufficient cooling of distribution transformers is achieved by means of ventilation openings in the transformer compartment, which is designed taking into consideration the transformer rating, losses and climatic conditions.

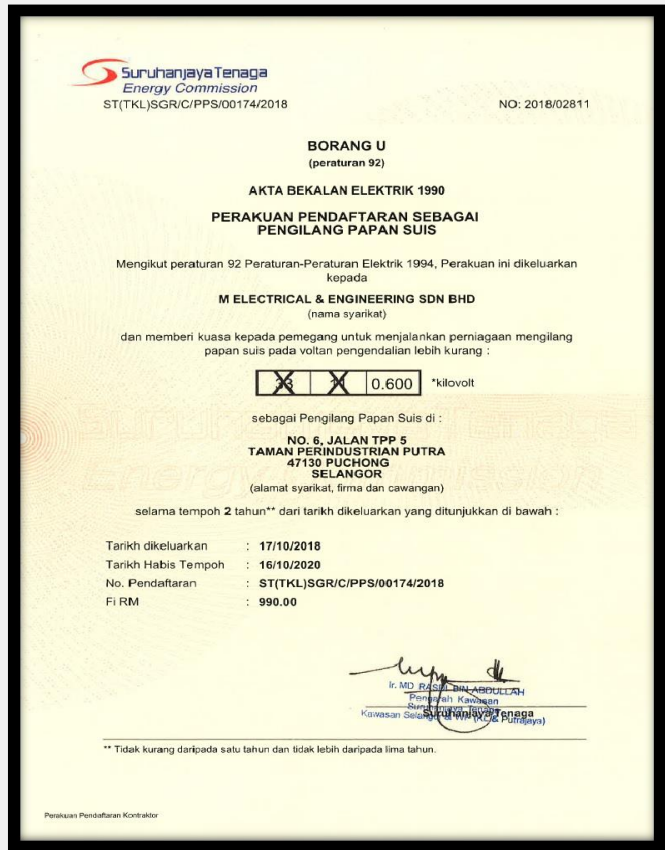
DOORS AND LOCKING SYSTEM

All compartment doors are fixed with door hinges, which provide high mechanical strength. Press-fit type gaskets ensure IP protection. Locks are equipped with the waterproof lever handles and a pad-lockable facility is also provided to protect against vandalism.



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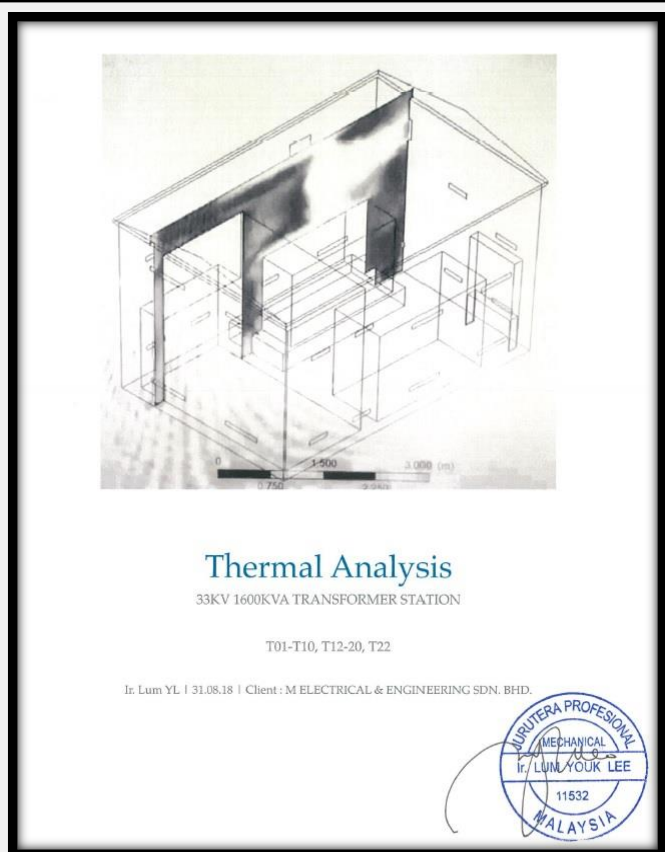
REGISTRATIONS & CERTIFICATIONS



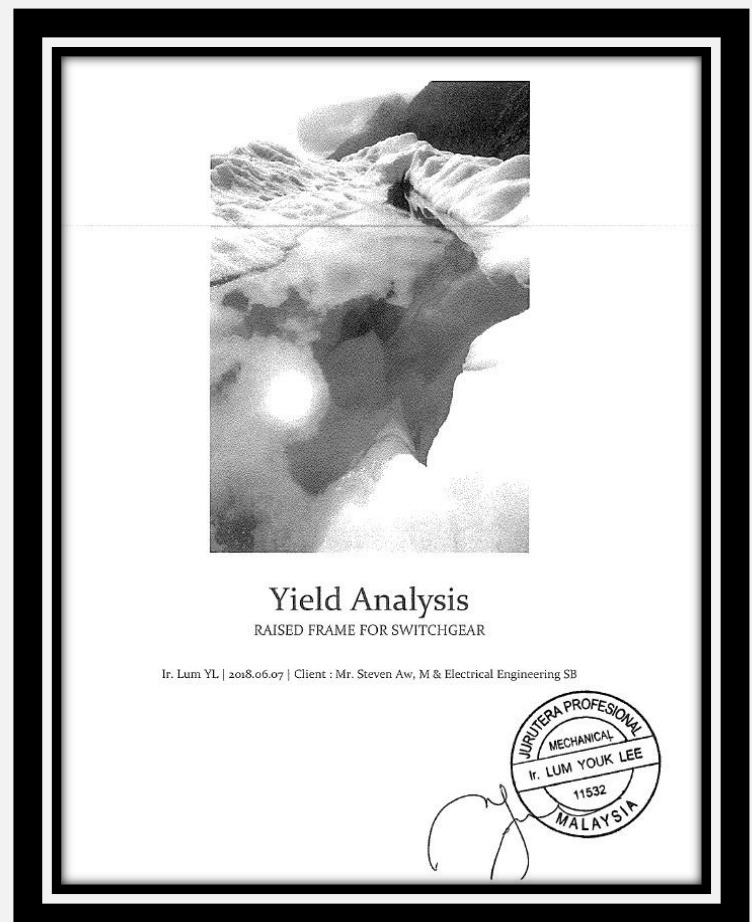
Registered Electrical Switch Board Manufacturer Under Energy Commission (ST) Malaysia



ISO 9001:2015 Certification From Global Group UK



Thermal Analysis Package Sub-Station



Yield Strength Analysis Raised Frame for E-House



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REFERENCE LIST OF CUSTOMERS (2018/2019)

LIST OF PROJECTS FOR M ELECTRICAL & ENGINEERING MAKE PACKAGE SUB-STATION

Project	Type	Purpose	Qty	Date
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	1	Jan/2018
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	3	Feb/2018
2MW Biogas Power Plant, Kulim	Package Sub Station	for 11kV VCB Panels & 2500kVA, 11/0.4kV Cast Resin	1	Mar/2018
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	2	Apr/2018
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	4	Jul/2018
1MW Biogas Power Plant, Kedah	Package Sub Station	for 11kV VCB Panels; 1500kVA, 11/0.4kV Cast Resin & LV MSB	1	Aug/2018
3MW AC Solar, Jelebu	Package Sub Station	for 11kV VCB Panel & 30VDC Tripping Supply Unit	1	Aug/2018
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	2	Aug/2018
30MW LSS Solar Plant, Gebeng	Package Sub Station	for 36kV RMU; 1600kVA 33/0.8kV Oil Transformer; 415V LV MSB	20	Dec/2018
30MW LSS Solar Plant, Gebeng	Package Sub Station	for 36kV RMU; 1250kVA 33/0.8kV Oil Transformer; 415V LV MSB	2	Dec/2018
Bioconversion Plant, Ijok	Package Sub Station	for 11kV VCB Panel & 1000kVA 11/0.433kV Oil Transformer	1	Jan/2019
Bioconversion Plant, Ijok	Package Sub Station	for 11kV RMU 2+1 & 1500kVA 11/0.433kV Oil Transformer	1	Feb/2019
2MW Biogas Power Plant, Taiping	Package Sub Station	for 11kV VCB Panels & 2500kVA, 11/0.4kV Cast Resin	1	Mar/2019
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	2	Mar/2019
Temporary Supply for KL118	Package Sub Station	for 11kV RMU 2+1 & 1500kVA 11/0.433kV Oil Transformer	1	Mar/2019
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	2	Apr/2019
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer, LV Feeder Pillar	3	May/2019
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	2	May/2019



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REFERENCE LIST OF CUSTOMERS (2018/2019)

LIST OF PROJECTS FOR M ELECTRICAL & ENGINEERING MAKE PACKAGE SUB-STATION (CONT'D)

Project	Type	Purpose	Qty	Date
1MW AC Solar, Rawang	Package Sub Station	for 11kV VCB Panel; 1250kVA 11/0.4kV Oil Transformer; 415V LV MSB	1	Jun/2019
OJI GSPP Temporary Power Supply	Package Sub Station	for 11kV RMU 2+1; 1000kVA 11/0.433kV Oil Transformer; 1600A MSB	1	Jul/2019
Utility Supply for Infrastructure/Building	Package Sub Station	for 11kV VCB Panels; Oil Transformer	2	Aug/2019

LIST OF PROJECTS FOR M ELECTRICAL & ENGINEERING MAKE OUTDOOR ENCLOSURE AND E-HOUSE

Project	Type	Purpose	Qty	Date
30MW LSS Solar Plant, Bidor	Outdoor Enclosure	for 36kV RMU 2+1	2	Feb/2018
2MW Biogas Power Plant, Kulim	Outdoor Enclosure	for 415V LV MSB	1	Mar/2018
TNB	Outdoor Enclosure	TNB Compact Sub Station	2	Mar/2018
LSS	Outdoor Enclosure	for Utility & Tool Storage	4	Mar/2018
30MW LSS Solar Plant, Bidor	Outdoor Enclosure	for 36kV RMU 2+2	6	Apr/2018
50MW LSS Solar Plant, Negeri Sembilan	Outdoor Enclosure	for 36kV RMU 2+1	21	Aug/2018
20MW LSS Solar Plant, Bukit Mertajam	Outdoor Enclosure	for 36kV RMU 2+1	8	Aug/2018
20MW LSS Solar Plant, Bukit Mertajam	E-House	for 36kV GIS & 110VDC Tripping Supply Unit	1	Aug/2018
TNB Field Trial	Outdoor Enclosure	TNB Compact Sub Station	1	Jan/2019
2MW Biogas Power Plant, Taiping	Outdoor Enclosure	for 415V LV MSB	1	Mar/2019
Cypark PV, Port Dickson	Outdoor Enclosure	for 33kV AIS VCB Panel & 110VDC Tripping Supply Unit	1	May/2019
TNB	Outdoor Enclosure	TNB Compact Sub Station	3	Aug/2019
10MW LSS Solar Plant, Kluang	Outdoor Enclosure	for 36kV GIS & 110VDC Tripping Supply Unit	1	Jan/2020
5MW LSS Solar Plant, Mersing	Outdoor Enclosure	for 11kV GIS & 30VDC Tripping Supply Unit	1	Jan/2020



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INSTALLATION REFERENCES



**11kV 1000kVA Package Sub-Station
(Bioconversion Plant, Ijok)**



**33kV Package Sub-Station with 1600A MSB
(30MW LSS Power Plant, Gebeng)**



**E-House for 33kV GIS Panel, RE Plant
(20MW LSS Power Plant, Batu Kawan)**



**11kV 1500kVA Package Sub-Station with LV MSB
(1MW Biogas Power Plant, Kedah)**



**Outdoor Enclosure for 33kV RMU 2+1
(Large Scale Solar Farm – 50MW Chembong; 30MW Bidor; 20MW Batu Kawan)**

**Outdoor Enclosure for 1250kVA 11/0.433kV Oil Immersed Transformer
(Top Glove F13 Upgrading Works)**



**Development of TNB Compact Sub-Station
(Tenaga Nasional Berhad)**

<http://www.m-electrical.com.my>



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