PROCEDURE
FOR THE TESTING AND COMMISSIONING OF GRID-CONNECTED PHOTOVOLTAIC SYSTEMS IN MALAYSIA

OVERVIEW AND REFERENCE STANDARDS

SUSTAINABLE ENERGY DEVELOPMENT AUTHORITY (SEDA)
MALAYSIA

2014

FOREWORD

With the launch of the Feed in Tariff (FiT) mechanism on 1st December 2011, the solar PV Industry in Malaysia has grown in leaps and bounds and is poised to continue this dynamic growth for years to come. With the proliferation of solar PV installations, it has become imperative for SEDA Malaysia to ensure these installations meet the international standards in terms of quality, reliability and safety. SEDA Malaysia is much aware the responsibility of monitoring the construction of all solar PV installations is a huge task which must be undertaken. It is with this key objective in mind the Procedure for the Testing and Commissioning of Grid Connected PV Installations has been prepared with the help of our technology partners.

The proposed Procedure has been deliberated exhaustively in a Workshop with participants from Suruhanjaya Tenaga (ST), Tenaga Nasional Berhad (TNB), Malaysia PV Industry Associations (MPIA), and PV service providers/ integrators. Feedback during the Workshop and written inputs from the participants has been incorporated in the final version.

The document which is aptly named Procedure for the Testing and Commissioning of Grid Connected PV Installations place the key responsibility to carry out the various testing and commissioning (T&C) procedures on the qualified personnel certified by SEDA Malaysia. SEDA Malaysia as the authorized agency to implement the feed in tariff mechanism under the RE Act 2011 will assign officials be present to witness the T&C of installations more than 12 kW. It is therefore critical the qualified persons are competent, and carry out their duties with the highest sense of integrity.

Lastly, I would like to thank Universiti Teknologi MARA (UiTM) for assisting SEDA Malaysia develop this Procedure and everyone who has contributed to the drafting of the Procedure for the Testing and Commissioning of Grid Connected PV Installations, including ST, TNB and MPIA.

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Guide to the Procedure

It is the legal responsibility of the Authority to ensure that all solar PV installations approved by the Authority are designed and constructed according to current international standards and best practices, while meeting minimum national safety standards for the protection of personnel and equipment. This Procedure for Testing and Commissioning of Grid-Connected Solar PV has been prepared to give developers and service providers a clear indication of the performance standards expected by the Authority for each category of PV installation, defined by installed capacity.

This Procedure is in addition to, and intended to complement, not replace, the Electricity Supply Act, the Renewable Energy Act, the Occupational Safety and Health Act, and their related subsidiary legislation. It gives details of the Testing and Commissioning (T&C) prior to Initial Operation Date (IOD)/ Commercial Operation Date (COD) mentioned in the Renewable Energy Technical and Operational Requirements Rules 2011 (T&O).

The Procedure is based mainly on International Electrotechnical Commission (IEC) and other International Standards which are listed below. Parts 1 to 4 of this Procedure provide the checklists for the inspection and testing of solar PV installations based on the installed capacity. The table below gives the categories and fees to be paid to SEDA Malaysia.

Procedure	Capacity of Installation	T&C to be witnessed by SEDA rep	Fees
Part 1	≤ 12 kW	No	Nil
Part 2	> 12 kW but < 72 kW	Yes	RM 3,500
Part 3	≥ 72 kW but ≥ 425 kW	Yes	RM 5,000
Part 4	> 425 kW	Yes	RM 7,000

The following points of the Procedure need to be highlighted:

- All the pre-commissioning tests for all categories are meant to be carried out and certified by the owner's qualified person without the presence of SEDA Malaysia representatives.
- The commissioning tests for installations up to 12 kW are to be carried out by the owner's qualified person (QP) without the presence of SEDA Malaysia representative.
    - However, SEDA Malaysia may inspect a particular installation if there is a complaint or request by the Feed-in Approval Holders (FiAHs).

- The commissioning tests for installations greater than 12 kW must be carried out by the respective qualified persons in the presence of SEDA Malaysia's representatives who will sign off on the commissioning checklist.
    - This checklist is a prerequisite to be submitted to TNB when applying for T&C of the grid interconnection.
- A minimum notice of 14 days must also be given to SEDA Malaysia when arranging the T&C (for SEDA rep witnessing), together with the payment of the prescribed fee. The notice to be sent to:

    SEDA Malaysia (T&C of PV projects)
    Galeria PjH
    Aras 9, Jalan P4W
    Presint 4, Persiaran Perdana
    62100 Putrajaya
    Email: RET@seda.gov.my

It is hoped that with the launch of this Procedure, all ambiguity concerning the testing and commissioning of solar PV installations of all capacities is removed. The qualified person (QP) holding the relevant SEDA Malaysia certificate is answerable to SEDA Malaysia for all installations certified by him/her.

GLOSSARY OF TERMS

Abbreviations

AC	Alternating Current
ACDB	AC Distribution Board
AM	Air Mass
CCTV	Closed Circuit Television
CMS	Central Monitoring Station
c-Si	Crystalline Silicon
DC	Direct Current
DCDB	DC Distribution Board
ELCB	Earth Leakage Circuit Breaker
EN	European Standard
FIAH	Feed-In Approved Holder
FIT	Feed-In Tariff
GCPV	Grid-Connected Photovoltaic
GPS	Global Positioning System
HV	High Voltage
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Ingress Protection
I_{mp}	Current at maximum power
I_{sc}	Short Circuit Current
LV	Low Voltage
MCB	Miniature Circuit Breaker
MCCB	Moulded Case Circuit Breaker
MPP	Maximum Power Point
MPPT	Maximum Power Point Tracking
MV	Medium Voltage
MVA	Mega volt amp
MW	Mega watt
MWp	Mega watt peak
NEC	National Electric Code (USA)
O&M	Operations and Maintenance
ONAF	Oil Natural Air Forced
ONAN	Oil Natural Air Natural
P_{mp}	Power at maximum power point
PR	Performance Ratio
PV	Photovoltaic
SLD	Single Line Diagram
STC	Standard Test Conditions
SY	Specific yield
THD	Total Harmonic Distortion
V_{mp}	Voltage at maximum power
V_{oc}	Open Circuit Voltage
VT	Voltage Transformer
Y_f	Energy yield
TG	Technical Guideline

Units

%	Percentage
°C	Degrees Celsius
A	Ampere
Hz	Frequency, hertz
km	kilo meter
kV	kilo volt
kVA	kilo volt ampere
kWh	kilo watt hour
kWp	kilo watt peak
m	Meter
m^2	square meter
mm	Millimetre
ms^{-1}	meter per second
MWh	Mega watt hour
Nm^{-2}	newton per square meter
Wm^{-2}	watt per square meter
Wp	watt peak

INTERNATIONAL CODES & STANDARDS CHECKLIST

The International Electrotechnical Commission (IEC) prepares and publishes international standards for all electrical, electronic and related technologies. The IEC standards also include PV systems for energy production and distribution. The work is accomplished under the IEC's Technical Committee 82 (IEC TC82).

In this TG, the main focus is given to IEC Standards. Wherever the topics are not covered by IEC Standards, EN (European Standards), IEEE (Institute of Electrical and Electronics Engineers, USA) & NEC (National Electric Code, USA) Standards are cross-referred and/or recommended.

This TG covers the standards related to the solar PV technology. For general engineering related topics, where components are used for conventional power generating systems, the relevant International or Malaysian standards should be followed since they are not covered in this document.

The following documents are of particular relevance for the design and construction of a PV system, where referenced throughout the guide the most recent edition should be referred to.

1 PV MODULES

Presently the following International Standards are relevant for PV modules:

Table 1: International standards relevant to solar PV modules

No.	Standard	Title
1	IEC 61215	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval
2	IEC 61646	Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval
3	IEC 61730 – Part 1	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction
4	IEC 61730 – Part 2	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing
5	IEC 61701	Salt mist corrosion testing of photovoltaic (PV) modules
6	IEC 62804[1]	System voltage durability test for crystalline silicon modules – design qualification and type approval
7	IEC 62716[2]	Photovoltaic (PV) modules – Ammonia corrosion testing

[1] The draft has been released and soon will be available for sale

[2] This Final Draft International Standard is an up to 3 months' pre-release of the official publication. It is available for sale during its voting period: 2013_04_05 to 2013_06_07.

The following tables describe the interpretation of each standard and the relevance for the installations.

Table 2: Summary & relevance of IEC 61215	
Standard	IEC 61215
Title	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval
Summary	It lays down requirements for the design qualification and type approval of terrestrial photovoltaic modules suitable for long-term operation in general open-air climates, as defined in IEC 60721-2-1. Determines the electrical and thermal characteristics of the module and shows, as far as possible, that the module is capable of withstanding prolonged exposure in certain climates.
Relevance	**Mandatory** to produce certificate conforming this standard if the technology of the PV modules used in the plant is crystalline.

Table 3: Summary & relevance of IEC 61646	
Standard	IEC 61646
Title	Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval
Summary	It lays down requirements for the design qualification and type approval of terrestrial, thin-film photovoltaic modules suitable for long-term operation in general open-air climates as defined in IEC 60721-2-1. This standard applies to all terrestrial flat plate module materials not covered by IEC 61215.
Relevance	**Mandatory** to produce certificate conforming this standard if the technology of the PV modules used in the plant is Thin Film.

Table 4: Summary & relevance of IEC 61730 – Part 1	
Standard	IEC 61730 – Part 1
Title	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction
Summary	It describes the fundamental construction requirements for photovoltaic modules in order to provide safe electrical and mechanical operation during their expected lifetime. Addresses the prevention of electrical shock, fire hazards, and personal injury due to mechanical and environmental stresses. Pertains to the particular requirements of construction and is to be used in conjunction with IEC 61215 or IEC 61646.
Relevance	**Mandatory** to produce certificate conforming this standard

Table 5: Summary & relevance of IEC 61730 – Part 2	
Standard	IEC 61730 – Part 2
Title	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing
Summary	The objective of the Part 2 of this standard is to provide the testing sequence intended to verify the safety of PV modules whose construction has been assessed by IEC 61730-1. The test sequence and pass criteria are designed to detect the potential breakdown of internal and external components of PV modules that would result in fire, electric shock and personal injury. The standard defines the basic safety test requirements and additional tests that are a function of the module end-use applications. Test categories include general inspection, electrical shock hazard, fire hazard, mechanical stress, and environmental stress.
Relevance	**Mandatory** to produce certificate conforming this standard

Table 6: Summary & relevance of IEC 61701	
Standard	IEC 61701
Title	Salt mist corrosion testing of photovoltaic (PV) modules
Summary	It describes test sequences useful to determine the resistance of different PV modules to corrosion from salt mist containing Cl- (NaCl, MgCl2, etc.). This Standard can be

	applied to both flat plate PV modules and concentrator PV modules and assemblies. Salt mist test is based on IEC 60068-2-52 rather than IEC 60068-2-11 as in edition 1 since the former standard is much more widely used in the electronic component field. According to this change the new edition 2 includes a cycling testing sequence that combines in each cycle a salt fog exposure followed by humidity storage under controlled temperature and relative humidity conditions. This testing sequence is more suitable to reflect the corrosion processes that happen in PV modules subjected to permanent or temporary corrosive atmospheres.
Relevance	**Mandatory** to produce certificate conforming this standard, when the installation location is in a marine environment, or in close proximity to the sea, where there could be a change between salt-laden and dry atmospheres, for examples in places where salt is used to melt ice formations.

Table 7: Summary & relevance of IEC 62716	
Standard	IEC 62716
Title	Photovoltaic (PV) modules – Ammonia corrosion testing
Summary	This standard describes test sequences useful to determine the resistance of PV modules to ammonia (NH_3). Photovoltaic (PV) modules are electrical devices intended for continuous outdoor exposure during their lifetime. Highly corrosive wet atmospheres, such as in the environment of stables of agricultural companies, could eventually degrade some of the PV module components (corrosion of metallic parts, deterioration of the properties of some non-metallic materials such as protective coatings and plastics – by assimilation of ammonia) causing permanent damages that could impair their functioning and safe operation.
Relevance	**Mandatory** to produce certificate conforming this standard, when PV modules operating under wet atmospheres having high concentration of dissolved ammonia (NH3). For example when there is a chance of developing aggressive ammonium hydroxide due to livestock barns (Poultry etc.)

Table 8: Summary & relevance of IEC 62804	
Standard	IEC 62804
Title	System voltage durability test for crystalline silicon modules – design qualification and type approval
Summary	Potential-induced degradation (PID) can cause high yield loss in PV systems. This draft discusses a test method involving a climatic chamber test at 60°C and 85% relative humidity. The aim of this work is to compare the different test methods and to arrive at a standard test procedure for numerous module types. Electroluminescence imaging at different module currents and low irradiance measurements provide early detection and characterization of PID effects on degraded modules from the field and in the lab.
Relevance	**Mandatory** to produce certificate conforming this standard for all framed PV modules, when the standard will come into force and available for sale.

2 PV INVERTERS

Presently the following International Standards are relevant for inverters in GCPV systems:

Table 9: International standards relevant to solar PV inverters		
No.	Standard	Title
1	IEC 62109-1	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
2	IEC 62109-2	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
3	IEC 62116	Test Procedure for islanding prevention measures for Utility connected photovoltaic inverters
4	IEC 61683	Photovoltaic Systems – Power conditioners – Procedure for measuring efficiency
5	EN 50524	Data sheet and name plate for photovoltaic inverters

The following tables describe the interpretation of each standard and the relevance for the installations.

Table 10: Summary & relevance of IEC 62109-1	
Standard	IEC 62109-1
Title	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
Summary	It applies to the power conversion equipment (PCE) for use in photovoltaic systems where a uniform technical level with respect to safety is necessary. Defines the minimum requirements for the design and manufacture of PCE for protection against electric shock, energy, fire, mechanical and other hazards. Provides general requirements applicable to all types of PV PCE.
Relevance	**Mandatory** to produce certificate conforming this standard

Table 11: Summary & relevance of IEC 62109-2	
Standard	IEC 62109-2
Title	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
Summary	It covers the particular safety requirements relevant to d.c. to a.c. inverter products as well as products that have or perform inverter functions in addition to other functions, where the inverter is intended for use in photovoltaic power systems. Inverters covered by this standard may be grid-interactive, stand-alone, or multi-mode. They may be supplied by single or multiple photovoltaic modules grouped in various array configurations, and may be intended for use in conjunction with batteries or other forms of energy storage. This standard must be used jointly with IEC 62109-1.
Relevance	**Mandatory** to produce certificate conforming this standard

Table 12: Summary & relevance of IEC 62116	
Standard	IEC 62116
Title	Test Procedure for islanding prevention measures for Utility connected photovoltaic inverters
Summary	It describes a guideline for testing the performance of automatic islanding prevention measures installed in or with single or multi-phase utility interactive PV inverters connected to the utility grid. The test procedure and criteria described are minimum

	requirements that will allow repeatability. Additional requirements or more stringent criteria may be specified if demonstrable risk can be shown. Inverters and other devices meeting the requirements of this standard are considered non-islanding as defined in IEC 61727.
Relevance	**Mandatory** to produce factory certificate conforming this standard

Table 13: Summary & relevance of IEC 61683	
Standard	IEC 61683
Title	Photovoltaic Systems – Power conditioners – Procedure for measuring efficiency
Summary	It describes guidelines for measuring the efficiency of power conditioners used in stand-alone and utility-interactive photovoltaic systems, where the output of the power conditioner is a stable a.c. voltage of constant frequency or a stable d.c. voltage.
Relevance	**Mandatory** to produce factory certificate conforming this standard

Table 14: Summary & relevance of EN 50524	
Standard	EN 50524
Title	Data sheet and name plate for photovoltaic inverters
Summary	This European Standard describes datasheet and nameplate information for PV inverters in grid parallel operation. The intent of this document is to provide minimum information required to configure a safe and optimal system with photovoltaic inverters. In this context, data sheet information is a technical description separate from the photovoltaic inverter. The nameplate is a sign of durable construction at or in the photovoltaic inverter. The nameplate may be inside the photovoltaic inverter only if the nameplate is visible once a door is opened in normal use.
Relevance	**Mandatory** to produce certificate conforming this standard

3 GRID-CONNECTED PV SYSTEM

Presently the following international standards are relevant for grid-connected PV systems:

Table 15: International standards relevant to grid-connection		
No.	Standard	Title
1	IEC 61727	Photovoltaic (PV) systems - Characteristics of the utility interface
2	EN 50438	Requirements for the connection of micro-generators in parallel with public low-voltage distribution networks
3	IEC 60364-7-712	Electrical installations of buildings - Part 7-712: Requirements for special installations or locations - Solar photovoltaic (PV) power supply systems
4	IEC 62446	Grid connected photovoltaic systems - Minimum requirements for system documentation, commissioning tests and inspection
5	IEC 61724	Photovoltaic system performance monitoring - Guidelines for measurement, data exchange and analysis
6	IEC 62093	Balance-of-system components for photovoltaic systems - Design qualification natural environments
7	IEC: 60904-1	Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics

The following tables describe the interpretation of each standard and the relevance for the installations.

Table 16: Summary & relevance of IEC 61727	
Standard	IEC 61727
Title	Photovoltaic (PV) systems - Characteristics of the utility interface
Summary	It applies to utility-interconnected photovoltaic (PV) power systems operating in parallel with the utility and utilizing static (solid-state) non-islanding inverters for the conversion of DC to AC. It lays down requirements for interconnection of PV systems to the utility distribution system.
Relevance	**Mandatory** to produce field test certificate conforming this standard

Table 17: Summary & relevance of EN 50438	
Standard	EN 50438
Title	Requirements for the connection of micro-generators in parallel with public low-voltage distribution networks
Summary	This European Standard specifies technical requirements for connection and operation of fixed installed micro-generators and their protection devices, irrespective of the micro-generators primary source of energy, in parallel with public low-voltage distribution networks, where micro-generation refers to equipment rated up to and including 16 A per phase, single or multi phase 230/400 V or multi phase 230 V (phase-to-phase voltage).
Relevance	**Optional** to produce factory test certificate conforming this standard

Table 18: Summary & relevance of IEC 60364-7-712	
Standard	IEC 60364-7-712
Title	Electrical installations of buildings - Part 7-712: Requirements for special installations or locations - Solar photovoltaic (PV) power supply systems
Summary	The particular requirements of this part of IEC 60364 apply to the electrical installations of PV power supply systems including systems with AC modules.
Relevance	**Recommended** to follow this standard

Table 19: Summary & relevance of IEC 62446	
Standard	IEC 62446
Title	Grid-connected photovoltaic systems - Minimum requirements for system documentation, commissioning tests and inspection
Summary	It defines the minimal information and documentation required to be handed over to a customer following the installation of a grid connected PV system. Also describes the minimum commissioning tests, inspection criteria and documentation expected to verify the safe installation and correct operation of the system. Is written for grid connected PV systems only.
Relevance	**Recommended** to follow this standard

Table 20: Summary & relevance of IEC 61724	
Standard	IEC 61724
Title	Photovoltaic system performance monitoring - Guidelines for measurement, data exchange and analysis
Summary	It recommends procedures for the monitoring of energy-related photovoltaic (PV) system characteristics, and for the exchange and analysis of monitored data. The purpose is the assessment of the overall performance of PV systems. Three of the IEC standard 61724 system performance parameters – final yield, reference yield, and performance ratio – define the system field performance in terms of energy production, solar resource, and system losses. These provide an easily understood method to not only compare system performance with other system options but also to permit system owners/customers to determine if system performance is meeting expectations. The Performance Ratio (PR) of the plant should be calculated based on this standard.
Relevance	**Recommended** to follow this standard

Table 21: Summary & relevance of IEC 62093	
Standard	IEC 62093
Title	Balance-of-system components for photovoltaic systems - Design qualification natural environments
Summary	It establishes requirements for the design qualification of balance-of-system (BOS) components used in terrestrial photovoltaic systems. Is suitable for operation in indoor, conditioned or unconditioned; or outdoor in general open-air climates, protected or unprotected. Is written for dedicated solar components such as batteries, inverters, charge controllers, system diode packages, heat sinks, surge protectors, system junction boxes, maximum power point tracking devices and switch gear, but may be applicable to other BOS components.
Relevance	**Recommended** to follow this standard

Table 22: Summary & relevance of IEC 60904-1	
Standard	IEC: 60904-1
Title	Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics
Summary	It describes procedures for the measurement of current-voltage characteristics of photovoltaic devices in natural or simulated sunlight. Lays down basic requirements for the measurement, defines procedures for different measuring techniques in use and shows practices for minimising measurement uncertainty.
Relevance	**Recommended** to follow this standard

4 GENERAL ENGINEERING STANDARDS

The following international standards are relevant for general engineering practices. It is recommended for all the stakeholders to follow these guidelines or the equivalent Malaysian Standards (MS) for designing the Balance of System (BoS) of the PV plant and for grid power quality.

Table 23: International standards relevant to general engineering		
No.	Standard	Title
1	EN 50160	Voltage characteristics of electricity supplied by public electricity networks
2	EN 1991-1-4	Actions on structures - Part 1-4: General actions - Wind actions.
3	EN 1991-1-2	Actions on structures - Part 1-2: General actions - Actions on structures exposed to fire.
4	EN 50521	Connectors for photovoltaic systems – Safety
5	IEC 60076	Power transformers - ALL PARTS
6	UV: HD 605/A1 Ozone: EN 50396; Flame: IEC 60332-1-2; Thermal Endurance: IEC 60216-1; UV: HD 605/A1; LSZH: IEC 61034, EN 52067-2, IEC 60754	DC Cables (Solar rated)

The following tables describe the interpretation of each standard and the relevance for the installations.

Table 24: Summary & relevance of EN 50160	
Standard	EN 50160
Title	Voltage characteristics of electricity supplied by public electricity networks
Summary	It is a European standard that gives the main characteristics of the voltage at the customer's supply terminals in public low voltage and medium voltage electricity distribution systems under normal operating conditions This standard gives the limits or values within which any customer can expect the voltage characteristics to remain, and does not describe the typical situation for a customer connected to a public supply network
Relevance	**Mandatory** to produce field test certificate conforming this standard

Table 25: Summary & relevance of EN 1991-1-4	
Standard	EN 1991-1-4
Title	Actions on structures - Part 1-4: General actions - Wind actions.
Summary	It is a European standard that gives design guidance and actions for the structural design of buildings and civil engineering works for wind. This includes the whole structure or parts of the structure or elements attached to the structure, e. g. components, cladding units and their fixings, etc. It is intended to predict characteristic wind actions on land-based structures, their components and appendages.
Relevance	**Recommended** to follow this standard or equivalent Malaysian Standard

Table 26: Summary & relevance of EN 1991-1-2	
Standard	EN 1991-1-2
Title	Actions on structures - Part 1-2: General actions - Actions on structures exposed to fire.
Summary	The methods given in this part of EN 1991 are applicable to buildings, with a fire load related to the building and its occupancy. It also deals with thermal and mechanical

	actions on structures exposed to fire, and thermal actions related to nominal and physically based thermal actions.
Relevance	**Recommended** to follow this standard or equivalent Malaysian Standard

Table 27: Summary & relevance of EN 50521	
Standard	EN 50521
Title	Connectors for photovoltaic systems – Safety.
Summary	This European Standard applies to connectors of application Class A according to IEC/EN 61730-1 for use in PV systems with rated voltages up to 1500 V DC and rated currents up to 125 A per contact. This standard applies to connectors without breaking capacity but might be engaged and disengaged under voltage. NOTE For connectors according to Class B and C of IEC/EN 61730 as well as for protection for Class II equipment intended for use between 0 V and 120 V d.c. in PV systems.
Relevance	**Recommended** to follow this standard or equivalent Malaysian Standard

Table 28: Summary & relevance of IEC 60076	
Standard	IEC 60076
Title	Power transformers - ALL PARTS
Summary	The power transformers used in the PV Plant should conform to this standard. This standard covers all parts of power transformers. This pack contains the following: IEC 60076-1 ed3.0, IEC 60076-2 ed3.0, IEC 60076-3 ed2.0, IEC 60076-4 ed1.0, IEC 60076-5 ed3.0, IEC 60076-6 ed1.0, IEC 60076-7 ed1.0, IEC 60076-8 ed1.0, IEC 60076-10 ed1.0, IEC 60076-10-1 ed1.0, IEC 60076-11 ed1.0, IEC 60076-12 ed1.0, IEC 60076-13 ed1.0, IEC/TS 60076-14 ed2.0, IEC 60076-15 ed1.0, IEC 60076-16 ed1.0, IEC 60076-18 ed1.0, IEC/TS 60076-19 ed1.0}, IEC 60076-21 ed1.0
Relevance	**Recommended** to follow this standard or equivalent Malaysian Standard

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