

	component except for the solar panels which shall have a minimum warranty period of 10 years.
e. Capacity building training for personnel in charge	<ul style="list-style-type: none"> ● Conduct capacity building training for personnel (Buildings & Grounds Services) in charge of maintenance of buildings Implemented by: and facilities on proper use and maintenance of the technology to ensure optimum efficiency. ● Develop and handover operations manual for personnel in charge. ● Establish coordination mechanisms (i.e. focal persons) to facilitate on-site and remote assistance in the operation and troubleshooting of the technology after installation and testing period.

3. Post Construction Phase

- a. Prepares of as-built plans
- b. Secure building certificate of occupancy and fire safety inspection certificate
- c. Turnover of all manuals, certificates and warranties of installed items

IV. SPECIFICATION OF MATERIALS

All materials and equipment shall be standard products of manufactures engaged in the production of such materials and equipment and shall be the manufacture's latest standard design.

A. 300W MONO CRYSTALLINE PHOTOVOLTAIC PANEL *see detailed drawing for specification*

B. 20KW 3 PHASE INVERTER TECHNICAL DATA SHEET *see detailed drawing for specification*

C. MOUNTING SYSTEM

The mounting structures will constitute of the main supporting structure of a suitable height in addition to the module holding sub structure with the necessary inclination in relation to the horizontal plane so as to gain the maximum of solar radiation and energy production.

In detail, the minimum specification of the mounting structure and sub structure are:

- a) Hot –Dip Galvanized steel structure / G90, minimum 2 mm thickness.
- b) Manufacturer's warranty should be at least 10 years.
- c) Durable design which is capable to withstand high-speed wind of at least 300 km/h, the contractor should provide a detailed design analysis and get approval prior the implementation.
- d) The steel structure shall be anti-corrosion, anti-rust and can withstand high humidity.
- e) The mounting structure shall be all fitted / pre-fabricated and should be assembled at the site (no welding)
- f) The Mounting structure should be fixed on ground using screw mounting (the Weight and Dimensions should be determined based on the Load Structural Load analysis)
- g) All bolts, nuts, and washers for the PV modules' mounting structure must be made of stainless steel. Stainless steel must not contact the PV modules' aluminum frames.
- h) All clamps in contact with the PV modules' aluminum frames must be made of aluminum.
- i.) All exposed sharp edges in the mounting structure must be covered with an appropriate material.

D. EARTHING PROTECTION

- a) A complete system for grounding the PV modules one by one and the mounting structure for safety.
- b) Each array structure of the PV system should be grounded properly.
- c) All metal casing/shielding of the plant are to be thoroughly grounded.
- d) To check the existing earthing system resistance and modify if need, the earth resistance should be 3-5 Ω .

E. WIRES & CABLE

The minimum specifications of the PV and AC cables are:

- a) PV cables shall comply with PEC standards.
- b) Operation temperature for PV cables should be up to +80 C
- c) PV cables shall be UV resistant, flame retardant, double insulated and with low smoke characteristics.
- d) PV and AC cables shall comply with PEC and international standards
- e) All external cables must be installed inside a cable basket, PVC Flexible pipes with glands shall be used between the modules and the cable basket tray
- f) PVC Flexible pipes with glands shall be used between the modules and the cable tray.
- g) The cable ties shall be black color and UV resistance.
- h) All cables shall be marked properly by means of good quality labels or by other means so that cable can be easily identified.
- i) All cables shall be marked in compliance with IEC 60446-3 category C Basic and safety principles for man -machine interface, marking and identification.
- j) Factory warranty shall be not less than 5 years.
- k) Cabling losses: the cable losses are 1-3%; from string to inverter (DC side), and from inverter unit to the load (AC side).

F. LABELLING

- a) Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place.
- b) Tags for each power cable or wire located in manholes, hand holes, and vaults shall be provided.
- c) Warning labels shall be provided and affixed in a conspicuous place.
- d) Warning Signs shall be provided and affixed in a conspicuous place in English Sign
- e. All labelling material shall be weather-resistant.

1. Emergency cases, fortuitous events or unforeseen contingencies arising during project/contract implementation, and such contingencies have an impact on the procurement at hand, such as:
 - a. Changes in the conditions affecting the project, e.g., a change in the place of delivery;
 - b. Time is of the essence in the implementation of the project, and any changes require immediate implementation; and
 - c. Additional requirements have been identified as necessary for the protection of the goods procured, such as changes in the packaging of the goods, or additional items have become necessary to ensure that the goods are sufficiently protected from the elements;
2. When the contract does not reflect the real intention of the parties due to mistake or accident, and the amendment is necessary to reflect the parties' intention; and
3. Other analogous circumstances that could affect the conditions of the procurement at hand.

VII. WARRANTY, DEFECTS AND LIABILITY

1. All workmanship shall have a minimum Defects Liability Period of one (1) year after contract acceptance or as provided for the contract documents.
2. The warranty for PV module defects after installation should be at least 10 years.
3. Warranty of Inverters after installation should be for 5 years at least. The warranty must state that the malfunctioning inverter must be exchanged by the manufacturer. The replacement inverter must be identical to or an improvement upon the original design of the malfunctioning inverter.
4. Factory warranty for wires and cable shall be not less than 5 years.