

# Technical Specifications

## Solar Panels

- Panel Wattage: Minimum of 550W or higher
- Panel Type: Monocrystalline
- Minimum Cell Efficiency: At least 22.5%

## Grid-Tied Inverter

- Inverter capacity as per the requirements allocated in the island.
- Rated Voltage: 400V
- Frequency: 50Hz
- Communication: Wi-Fi or Ethernet

## Material Characteristics and Standards

All materials provided must comply with international standards for photovoltaic systems. The equipment should adhere to the latest editions of the following codes, standards, and regulations (or their equivalents):

1. Maldives Energy Authority Codes and Regulations.
2. IEC 61730; IEC 61730-1:2004 and IEC 61730-2:2004 – Safety qualifications for photovoltaic modules.
3. IEC 61215 and IEC 61646; IEC 61215:1993 and IEC 61215:2005 – Design qualification and type approval for crystalline silicon PV modules.
4. IEC 60364-7-712 – Electrical installations for buildings, focusing on solar PV systems.
5. IEC 61727 – Specifications for utility interaction of PV systems.
6. IEC 61683 – Efficiency measurement procedures for photovoltaic systems.
7. IEC 62446 – Documentation, testing, and inspection requirements for grid-connected PV systems.

## Scope of Supply

### 1. Documentation

**post-completion:**

Upon project completion, the following documents must be provided:

- **System Information:**

1. General system details.
2. Single-line power connection diagram.
3. Installation layout.
4. PV module specifications.
5. Datasheets and manuals for inverters.
6. Relevant authority-approved documents.

- **Testing and Commissioning Results:**

1. Technical screening report.
2. Inverter protection settings (e.g., voltage and frequency thresholds).
3. Electrical single-line diagrams.
4. Inspection reports.
5. PV array test data.
6. Certification of verification.

- **Operation & Maintenance:**

1. System operation verification procedure.
2. Troubleshooting guide for system failures.
3. Shutdown and startup procedures.
4. Maintenance and cleaning instructions.

## Quality Assurance

The contractor must implement a quality system that aligns with current British Standards 5750 Part 1 or comparable international standards.

## Major Equipment Requirements

### 1. Photovoltaic Modules:

- Must meet the latest IEC standards or equivalent BIS standards for PV qualification and safety.
- Modules must conform to IEC 61215, IEC 61701, and IEC 61730 Part I & II.
- Monocrystalline modules with aluminum frames and durable face covers.
- Tested and packaged to withstand shipping without damage.
- PV modules shall be PID resistant
- PV modules shall be guarantee 30 years power performance with not more than 1% power degradation in first year and 0.4% annual power attenuation
- PV modules shall be guarantee 12 years against any kind of production defect.
- PV module brands must be from reputable and renowned manufacturers.

### 2. Grid-Tied Inverter:

- High-efficiency inverters (minimum 98%) with a built-in DC isolation switch and surge protection.
- Capable of remote monitoring via the internet.
- The inverters shall have an inbuilt DC isolation switch.
- The inverters shall have surge protection.
- IP65 rated for outdoor use.
- Utilizes natural cooling technology.
- **Accepted Brands:**
  - ABB
  - Huawei
  - Fronius
  - SMA Solar Technology AG
  - Sungrow
- Warranty: Minimum of 10 years.

3. **Combiner Box:**

- IP65-rated distribution boards and combiner boxes adhering to IEC 62271.
- Properly mounted with durable materials resistant to environmental conditions.

4. **Earthing System:**

- A complete and reliable earthing system designed for the PV installation.

5. **Mounting Structures:**

- Anodized Aluminum or corrosion-resistant materials.
- Designed to withstand wind speeds of at least 60 km/h.
- Guaranteed stability for 12 years in harsh environments.

6. **Cables:**

- All DC cables must be tinned copper, corrosion-resistant, chemical-resistant, and UV-resistant.
- All cables should be enclosed in conduits or cable trays.
- All AC cables must be copper with UV protection.
- All the cables must be power rated.

**Warranty Requirements**

- The warranty for key components must meet or exceed the following minimum standards:
  - **PV Modules:** 12 years against defects and 20 years with 91% efficiency with 30 years performance warranty.
  - **Inverters:** 10 years.
  - **Mounting Structures:** 12 years.
- The contractor is responsible for all regulatory and service documentation required for permits, net metering, and grid connection. Relevant signatures from the client will be provided, but the contractor must handle all other formalities.

To meet evaluation standards, the proposal should clearly outline:

- Manufacturer warranties for PV panels and inverters.
- Service warranties for the installed PV system.