

## **FIRE PROTECTION SYSTEM**

### **1.1 Hose Reels**

- 1.1.1 Recess Hose reels approved to BS EN 671-1: 1995, or any other equable International Standard, Automatic operation, Right or Left hand take off. Including 30m length of Hose, 19mm diameter hose approved to PR EN 694, or any other equable international standard, and nylon twist operated jet / spray nozzle on mounting plate with integral flexi guide for hose withdrawal device. 03 or 04 fixing holes should be provided in position indicated to suit M8/M10 sized fixing screws or M12 fixing bolts. With ball valve inlet and flexible inlet water pipe.
- 1.1.2 The overall width of the reel should be no more than 850mm. The overall height of the reel should be less than 850mm including Hose and integral Flexi guide for hose withdrawal guide. The overall depth of the reel should no more than 150mm. Color of the reel should be red, fitted with operating instruction plate.
- 1.1.3 The Hose Reels and the related equipment's should be approved by the NSS Fire and Rescue Service before Installation. Special permission should be taken for the size of the Hose reels.
- The Hose Reels nozzle retainer or hose guide and inlet valve should be fitted at height of about 900mm above floor level.

### **1.2 Hose Reel Cabinets.**

- 1.2.1 The hose reel should be recess mounting type with or without glass paneled door for use with the above mentioned sized Hose Reels. Hose Reel Cabinet dimension should be no more than 900mm in width, 900mm in height, 300mm in depth (including door).
- 1.2.2 Color of the cabinet should be Red. Special permission should be taken for other color.
- 1.2.3 Recessed latch type handle should be installed. Hose reel signage should be in accordance to BS 5499 or any other equable international Standard. Fixing hole should be provided.
- 1.2.4 The Hose Reel cabinets should be approved by the NSS fire and Rescue Service before Installation.

**Water Supply for Hose Reel System.**

- 1.3.1 As a minimum, the water supply to the hose reel should be such that when the two far most reels in the premises are in use simultaneously, each should provide a jet of approximately 6m in length and will deliver not less than 0.5litre/s (30 litre/min).
- 1.3.1.1 Minimum Quantity of water storage required for hose reel system only.
- 1.3.1.2 Minimum storage required for the first hose reel; 2275litre.
- 1.3.1.3 For each additional hose reel; 1137.5litre to a maximum of 9100litre
- 1.2.5 Tank or inter-connected tanks supplying water for the hose reel should be automatically supplied from the fresh water main(s) controlled by ball valve of a minimum diameter 50mm. Rain water collected from roof can also be stored.
- 1.2.6 Tanks supplying water for domestic purposes should not be used as suction tanks for hose reel installation unless arrangement have been made these domestic supplies to be drawn off in such a manner that the reserve of water for the hose reel installation is always preserved.
- 1.2.7 The piping details of the supply o f water for the hose reel system and the water supply system should be approved by the NSS fire and Rescue Service before Installation.
- 1.2.8 Special permission should be taken if it is different from the above.

**1.4 Hose Reel Booster Pump system.****1.4.1 Hose Reel booster pump set, complete with In and Out galvanized steel pipe work with or without expansion vessel.**

- 1.4.1.1 Where the water pressure in the hose reel mains needs to be boosted, the provision of an electrically driven pump is usually a convenient method. A duplicate standby pump should be always provided.
- 1.4.4.2 Both motors and pump should be sited in fire-protected position and the electrical supply to them should be an Exclusive Circuit with the cables following a route of negligible fire risk or be provided with adequate protection.
- 1.4.4.3 The booster pumps systems should come into operation automatically on a drop in pressure or a flow of water. Both pumps should be automatically primed at all times.

- 1.4.4.4 All pumps should also be capable of being started or stopped manually. The standby pumps should be so arranged that it would operate automatically on a failure for any reason of the duty pump.
- 1.4.2 The Hose Reel Booster Pump set should be approved by the NSS Fire and Rescue Service before installation.
- 1.4.3 Special permission should be taken if it is different from above.

## **2.1 Fire Extinguishers.**

- 2.1.1 2Kg Co2 stored pressure Extinguisher approved to BS En 3. Aluminium alloy Body approved to BS5045 Part 3 or any other equable International Standard. Red Body with black band or black colored head cap, swivel Horn, English screen. Fully charged.
- 2.1.2 The Extinguisher Should be approved by the NSS Fire and Rescue Service before Installation. Special permission should be taken if it is different from above.
- 2.1.3 9 liter Water Extinguisher (Gal Cartridge Type) approved to BS EN 3 or any other equable International Standard. Red body head cap. English screen, fully charged.
- 2.1.4 The Fire Extinguisher should be approved by the NSS Fire and Rescue Service before Installation. Special permission should be taken if it is different from the above.
- 2.1.5 Fire Extinguishers should be located in conspicuous positions on bracket or stands where they will be readily seen by person. The carrying handle of larger heavier extinguishers should be about 01m from the floor level. But smaller Extinguisher should be mounted so as to position the handle 1.5m from the floor level. Extinguisher installing on the cabinet the height should be approved by NSS Fire and Rescue Service.

## **2.2. Cabinet for the Extinguishers.**

- 2.2.1 Cabinets for the Extinguishers should be of stainless steel with or without glass-fronted doors. Color of the cabinet Red or to suit the requirements of architectural surroundings. Recessed Latch Type handle should be installed.
  - 2.2.1.1 Fire Extinguisher Single Cabinets dimension should be no more than 190mm in width, 640mm in height, 180mm in depth (including door),
  - 2.2.1.2 Fire Extinguisher Double Cabinets dimension should no more than 440mm in width, 640mm in height, 180mm in depth (including door).
- 2.2.2 The cabinets for the Fire Extinguisher should be approved by the NSS fire Rescue Service before installation. Special permission should be taken if different from above.

### 3.1 Fire Doors

- 3.1.1 All fire doors should be opened to the direction of the flow of the people while in emergency.
- 3.1.2 These doors should be installed with self-closing device including the panic latch. These panic Latch devices should conform to BS 5725 Pt 1 or any other equable international standard.
- 3.1.3 Fire doors conforming to the method of construction as stipulated below shall be deemed to meet the requirements of the fire-resisting period.
- 3.1.3.1 Doors frames constructed in accordance with one of the following specification should be deemed to satisfy the requirements for doors having fire resisting period of half-hour (30min).
- 3.1.3.2 A single door 900 millimeters wide x 2100 millimeters high maximum or double doors 1800 millimeters high maximum construction of solid hardwood core of not less than 37 millimeters laminated with adhesives conforming to either BS 745 “Aminal Glues”, or BS 1204, “Synthetic resin adhesives (phenolic and aminoplastic) for wood” Part 1, “Gap-filling adhesives” or BS 1444 “Cold – setting casein glue for wood”, or any other equable International Standard, faced both sides with plywood to a total thickness of not less than 43mm with all edges finished with a solid edge strip full width of the door. The meeting stiles of double doors shall be rabbeted 12mm deep or maybe butted provided the clearance is kept to a minimum.
- 3.1.3.3 Doors may be double swing provided they are mounted on hydraulic floor springs and clearance at floor not exceeding 4.77mm and frame and meeting stiles not exceeding 3mm;
- 3.1.3.4 A vision panel should be incorporated provided it does not exceed 0.065 square meter per leaf with no dimension more than 1370mm and should be glazed with 6mm Georgian wired glass in hardwood stops;
- 3.1.3.5 Doors constructed in accordance with BS459 part 3 : 1951 or any other equable International Standard fire check flush doors and wood and metal frames (half hour type);
- 3.1.3.6 Timber frames for single swing half hour fire doors of overall width of 60mm including 25mm rabbet and depth to suit door thickness plus 34mm stop;

- 3.1.3.7 Metal frames half hour fire doors shall be of sheet steel not lighter than 18 gauge of overall width 50mm including 18mm rabbet and depth to suit the door thickness plus 53mm stop;
  - 3.1.3.8 Timber or metal frames for double swing doors should be as specified above with minimum clearances between frame and door;
  - 3.1.3.9 Double doors with rabbeted meeting stiles should be provided with co-ordinating device to ensure that leafs close in the proper sequence;
  - 3.1.3.10 Fire doors may held open provided the hold open device incorporated a heat activated device to release the door. Heat activated devices shall no be permitted on fire doors protection openings to protected corridors or protected staircase.
- 3.1.4 The Fire doors and its related devise should be approved by NSS fire and rescue Service before Installation.
- 3.1.5 Special permission should be taken if it is different from above.

#### **4.1 Fire Exit Signs**

- 4.1.1 Photo luminescent Fire exit signs should sign each fire Exit door. The Symbol height should be not more than 100mm.
- 4.1.2 The fire Exit should be approves by the NSS fire and Rescue Service before Installation.
- 4.1.3 Special Permission should be taken if it is different from above.

#### **5.1 Fire Detection and Alarm System.**

- 5.1.1 Fire detection and Alarm system should confirm to BS 5839 or any other equable international Standard. Fire Detection and alarm system should be analogue Addressable System with mimic diagram. A system in which signals from each detector and/or call point are individually identified at the control panel. Fire Detection and alarm system should consist of Automatic Detectors, Manual Call Points, Control and indicating equipment, etc. It should also covers System capable of providing signals to initiate, in event of fire, the operation of ancillary services such as fixed fire extinguishing systems and other precautions and actions. Main Fire Control Panel should be located at easy access point.
  - 5.1.1.1 Red Xenon Beacon should be weather resistant IP65 rate Xenon.
  - 5.1.1.2 24 Tone Wall Sounder Compact should confirm BS 5839 Pt. 1 or any other equable international standard.

- 5.1.1.3 Wiring for detectors should be Fire Resistant Cable.
  - 5.1.1.4 Heat Detectors should comply with BS5445 or any other equable International Standard.
  - 5.1.2 The Fire Detections and Alarm System and all related equipment's should be approved by NSS fire and Rescue Service before Installation including all the relevant equipments.
  - 5.1.3 Wiring details and the positioning of detectors, Call points, etc. for Fire Detection and alarm system should be approved by the NSS Fire and Rescue Service before Installation.
  - 5.1.4 Special permission should be taken if it is different from above.
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# 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.