Plant	Client	EPC Contractor	Document ID	Contract No.
SUNMASTER			2013-SM-G00-BD-0001	

Sunmaster Solar Jinhua Zhejiang China	**Subject:** **Maintenance plan**			**SunMaster Solar Lighting Co.,ltd**		
		Rev	01	Page		of

Q'ty	BOQ.Ref	Description	Subcontractor	Contractor	Received by ER.	Date
1		Maintenance plan				
2		Inspection & Maintenance Checklist				
3						
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8						
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10						

Engineer Representative's approval/Comments:

SunMaster / Vendor			/ Owner /Client		
Category Codes (Submission Purpose)	☐ 1	For Approval	Category Codes (Submission Purpose)	☐ 1	For Approval
	☐ 2	For Review /Comments		☐ 2	For Review /Comments
	☐ 3	For information		☐ 3	For information
	☐ 4	For Engineering		☐ 4	For Engineering
	☐ 5	For Enquiry		☐ 5	For Enquiry
	☐ 6	For Order Placement		☐ 6	For Order Placement
	☐ 7	Final & Approved		☐ 7	Final & Approved
	☐ 8	Released for construction		☐ 8	Released for construction
Acceptance Codes (Approved Codes)	☐ 1	Approved	Acceptance Codes (Approved Codes)	☐ 1	Approved
	☐ 2	Approved for Manufacturing/Fabrication with comments as marked		☐ 2	Approved for Manufacturing/Fabrication with comments as marked
	☐ 3	Not Approved /Resubmit		☐ 3	Not Approved /Resubmit
	☐ 4	Retained for information /Records		☐ 4	Retained for information /Records
	☐ 5	Reviewed		☐ 5	Reviewed
	☐ 6	Reviewed as Noted /Resubmit		☐ 6	Reviewed as Noted /Resubmit

Remarks for AC2: This marked-up drawings are hereby approved for fabrication. / Manufacturing and shall b e r e-submitted after revision. This drawing should be revised only to the extent of SunMaster / Owner / Client comments. Any other changes made by you will not be considered unless clearly highlighted in covering letter asking for approval.

This approval / review does not absolve the supplier from the full responsibility for design and fabrication.

Data: / / Name:

Date: / / Name:

Maintenance plan for Solar Street Lights

SunMaster’s solar streetlights are designed to be essentially maintenance free. In certain regions with extreme conditions, however, some level of maintenance is required to ensure the proper function of the lights. These regions are typically where there is a risk of dust, sand, snow, or ice covering the solar panels and thus reducing the power of the lights. In regions with frequent rain, the tilt angles and the technology of the solar panels allow for self-cleaning of dust. However, in places where rain is infrequent, periodic manual cleaning of the solar panels must be required.

1. The main components maintenance points

①solar streetlights controller affects the system's lighting time and brightness changes. Because the components of solar street lights have different life, they are battery and controller who mainly control the lighting time and brightness changes, if you find the lighting time of street light is not enough, you should first check the battery power, and check the controller at the same time, Each manufacturer's controller has instructions, are generally equipped with a working status indicator, which can initially determine whether the solar street light system is working properly. It’s recommended to install the remote monitoring systems for big projects in order to easily monitoring the status of the electrical components and save money, time, effort during the operations and maintenance.

② solar panels. Solar panels are the key components for solar streetlights in providing energy, so it is necessary to ensure that the solar panels are complete in a good status and clean to maintain the efficiency and electricity production. Main considerations are keeping the solar panels clean to avoid the hotspot that damage the panels on the long run.

③solar battery. Mainly includes paying attention to security, checking whether the solar streetlights charge and discharge normally. Can refer to the work status of solar street light controller make preliminary judgment and can check the power levels of battery charge and discharge, It is strictly forbidden to adjust the working state of the solar street light controller without authorization, to avoid the overshoot and over discharge for the battery.

④ street light source. This is relatively simple. First of all, to strictly prohibit hard objects and sharp objects hitting or impacting, and often check the working status of the light source, timely maintenance once the individual lamp beads are not lighting. To avoid damage to the entire light.

⑤ solar poles and accessories. In particular, pay attention to checking the configuration of the installation door must be complete, in time to make up if damaged and lost, because the internal installed the solar street lights controller and related lines, it is likely to cause short-circuit and damage if the rain falls in.

1 Typical maintenance schedule

🕑**Every Week:** Inspect streetlights to ensure all the lights are working. If there are lights which are not functioning, perform analysis immediately to understand cause and conduct repairs. As fast as detecting the malfunction to avoid the full damage of the lighting system. In the force majeure a periodical cleaning for the solar panels is important to maintain the high performance and keep on the lifetime of the system operations.

🕑 **Every Two Months:** Inspect Street light panels and clean ones which are covered with dust or sand. The best way to clean the panels is with a brush at the end of a long pole. Cares should be taken to avoid damaging the solar panels and consult Sunmaster technical team to get the complete cleaning instructions.

🕑 **Every Five to seven Years:** Replace the solar street light components within the expected lifetime like batteries if the voltages drop below normal levels. The battery has an expected life of five-seven years.

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Inspection & Maintenance checklist

LED STREET LIGHT

Check for physical damage to any appearance
- Yes
- No

Check for loose cable terminations
- Yes
- No

Check for loose screws
- Yes
- No

Check for any LED bulb failed
- Yes
- No

If the total luminous output within the required range
- Yes
- No

Is the equipment mounted securely, and level?
- Yes
- No

SAFETY EQUIPMENT TO PERFORM INSPECTION

- Yes
- No
- N/A

IS THE SYSTEM POWERED ON?

- Yes
- No
- N/A

DO NOT PROCEED IF ALL ANSWERS ARE NOT YET COMPLETED

Comment :

CHARGE CONTROLLERS

Status/Condition
- Yes
- No
- N/A

Input and output disconnects labelled
- Yes
- No
- N/A

Listed charge controllers
- Yes
- No
- N/A

Proper wire sizes
- Yes
- No
- N/A

Comment :

SOLAR MODULE

Total capacity Solar Array (W):
Solar Module size (watt peak per module): Wp
Type of solar module (mono/polycrystalline) :
Brand of solar module :
Model of solar module :

Cracked glass of PV panel
- Yes
- No

White or brown spot,bubble of air,moisture behind the glass
- Yes
- No

Broken back sheeting (white EVA), delamination
- Yes
- No

Junction boxes at backside loose or without cover?
- Yes
- No

Check for physical damage to any PV module
- Yes
- No

Check for loose cable terminations between PV modules
- Yes
- No

Shading on solar panels removed
- Yes
- No

Check surfaces temperatures with IR camera or if using contactless thermometer
- Yes
- No

ARRAY INSTALLATION AND WIRING

Proper connectors on array wiring extensions
- Yes
- No

Proper grounding of array & array mount
- Yes
- No

Wrong cable dimension used?
- Yes
- No

BATTERY BANK

Terminals protected from shorting
- Yes
- No
- N/A

Cables properly terminated (no set screw lugs on fine stranded wire)
- Yes
- No
- N/A

Maintenance-free vented for cooling
- Yes
- No
- N/A

Check for battery ambient temperature?
- Yes , the temperature degree is = °C
- No

Labelled with proper safety procedures
- Yes
- No
- N/A

Brand of battery :
Type of battery :
Nominal capacity (volts per cell) :
Battery capacity/cell (Ah) :
Battery voltage (individual battery) : V
Battery voltage (per bank battery) : V
Battery current (per bank battery) : A

Are there hot battery cells (touch by hand each cell)?:
- Yes
- No

Proper insulation around battery-to-battery cables?
- Yes
- No
- N/A

Exposed main battery bank combiner terminal?
- Yes
- No
- N/A

Incorrect battery connections?
- Yes
- No
- N/A

Main cables exposed to physical damage?
- Yes
- No
- N/A

Signs of sulfide flakes at terminals?
- Yes
- No
- N/A

Check battery banks with IR camera temperature or if using contactless thermometer
- Yes
- No

Check fuses banks with IR camera temperature or if using contactless thermometer
- Yes
- No

Check battery rack and DC distribution box
- Yes
- No
- N/A

Check cable connector fasteners for torque values
- Yes
- No
- N/A

Comment :

WIRING

The minimum bending radius of the cable or PV Wire is no more than 5x the diameter of the cable. (i.e. for .02 inch diameter, minimum bending radius is 1.0 inches, total bend is 2.0 inches)?
- Yes
- No
- N/A

STRUCTURAL

Is equipment mounted securely, and level?
- Yes
- No
- N/A

Any sign of damage to modules or wiring?
- Yes
- No
- N/A

Comment :