



COPY TO

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- 10.Quality assurance Officer Director (QA) Delhi Directorate/ Mumbai,  
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- 11.Concurrent Audit
- 12.MIS Cell
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( )  
Assistant Director (S) / Section Officer / Deputy Director  
FOR DIRECTOR GENERAL OF SUPPLIES & DISPOSALS

**SCHEDULE - A**

1. RATE CONTRACT No.:-Solarlight/IT-2/RC-D3020000/1008/82/02509/0380  
Dated 20-NOV-07 FOR THE SUPPLY OF Solar Lighting System

2. ADVANCE RATE CONTRACT NO.-Nil

Dated

3.(a) NAME AND FULL ADDRESS OF THE FIRM -

SU SOLARTECH SYSTEMS (P) LTD.  
SCO 184, Sector 7-C,  
Chandigarh  
CHANDIGARH - 160019  
Tel. No. - 0172-2792699  
Fax - 0172-2792576  
Email - solartech@glide.net.in

(b) NAME AND FULL ADDRESS OF MANUFACTURER -

i.SU SOLARTECH SYSTEMS (P) LTD.  
739, Industrial Area, Phase-II, Chandigarh- 160002  
ii.SU SOLARTECH SYSTEMS (P) LTD. 481 Industrial Area,Phase-I  
Panchkula

(c) BRAND: SSSPL / Solartech

4. VALIDITY OF RATE CONTRACT :: 20-NOV-07 To 31-OCT-08

5. DESCRIPTION OF ITEM, SPECIFICATION,UNIT, RATE

Item No.	Model No.	Store Description	Unit	Rate
				(in Rs.)
1	SSSPL/SP V37	Spare PV Module For Solar Lighting System as per MNES Specification	Suitable for: Home lighting & Street lighting,PV module Rating: 37 Wp,Cable Length in mtrs.: 3	NOS. 7504 Rs. SEVEN THOUSAND FIVE HUNDRED FOUR ONLY
2	SSSPL/SP V74	Spare PV Module For Solar Lighting System as per MNES Specification	Suitable for: Home lighting & Street lighting,PV module Rating: 74 Wp,Cable Length in mtrs.: 3	NOS. 14602 Rs. FOURTEEN THOUSAND SIX HUNDRED TWO ONLY
3	SSSPL/SP V18	Spare PV Module For Solar Lighting	Suitable for: Home lighting & Street lighting,PV module Rating: 18 Wp,Cable Length in mtrs.: 3	NOS. 3650 Rs. THREE THOUSAND SIX HUNDRED

		System as per MNES Specification			FIFTY ONLY
4	SSSPL/SP V10	Spare PV Module For Solar Lighting System as per MNES Specification	Suitable for: Solar Lantern,PV module Rating: 10.0-11.9 Wp,Cable Length in mtrs.: 5	NOS.	2080 Rs. TWO THOUSAND EIGHTY ONLY
5	SSSPL/SP V12	Spare PV Module For Solar Lighting System as per MNES Specification	Suitable for: Solar Lantern,PV module Rating: 12.0-14.0 Wp,Cable Length in mtrs.: 5	NOS.	2496 Rs. TWO THOUSAND FOUR HUNDRED NINETY-SIX ONLY
6	SSSPL/Mo del IIA	Solar Lantern ( ) MNES Specification	Model Number: IIA,CFL Lamp Rating: 7W,Battery Capacity: 12 V, 7.00 AH	NOS.	3632 Rs. THREE THOUSAND SIX HUNDRED THIRTY-TWO ONLY
7	SSSPL/Mo del IIB	Solar Lantern ( ) MNES Specification	Model Number: IIB,CFL Lamp Rating: 7W,Battery Capacity: 12 V, 7.00 AH	NOS.	3944 Rs. THREE THOUSAND NINE HUNDRED FORTY-FOUR ONLY
8	SSSPL / DOMLITE1 218/20 / MODEL I	Solar Home Light System With Structure ( ) MNES Specification	Model Number: 1,No. of CFL Lamps of 9 or 11W Rating: 1,DC Fan Rating: -,Battery Voltage and Capacity: 12 V, 20 AH	NOS.	8900 Rs. EIGHT THOUSAND NINE HUNDRED ONLY
9	SSSPL / DOMLITE1 240/37 / MODEL II	Solar Home Light System With Structure ( ) MNES Specification	Model Number: 2,No. of CFL Lamps of 9 or 11W Rating: 2,DC Fan Rating: -,Battery Voltage and Capacity: 12 V, 40 AH	NOS.	14703 Rs. FOURTEEN THOUSAND SEVEN HUNDRED THREE ONLY
10	SSSPL / DOMLITE1 240/37F / MODEL III	Solar Home Light System With Structure ( ) MNES Specification	Model Number: 3,No. of CFL Lamps of 9 or 11W Rating: 1,DC Fan Rating: less than 20 W,Battery Voltage and Capacity: 12 V, 40 AH	NOS.	14936 Rs. FOURTEEN THOUSAND NINE HUNDRED THIRTY-SIX ONLY
11	SSSPL / DOMLITE1	Solar Home Light System	Model Number: 4,No. of CFL Lamps of 9 or	NOS.	25500

275/74F / MODEL IV	With Structure ( MNES Specification )	11W Rating: 2,DC Fan Rating: less than 20 W,Battery Voltage and Capacity: 12 V, 75 AH		Rs. TWENTY- FIVE THOUSAND FIVE HUNDRED ONLY
12 SSSPL / DOMLITE # 1275/74 / MODEL V	Solar Home Light System With Structure ( MNES Specification )	Model Number: 5,No. of CFL Lamps of 9 or 11W Rating: 4,DC Fan Rating: -,Battery Voltage and Capacity: 12 V, 75 AH	NOS.	26100 Rs. TWENTY- SIX THOUSAND ONE HUNDRED ONLY
13 SSSPL / SLITE127 5/74	Solar Street Light System With Mounting Structure & Pole ( MNES Specification )	Description of Item: Solar Street Light System With Mounting Structure and Pole .	NOS.	27550 Rs. TWENTY- SEVEN THOUSAND FIVE HUNDRED FIFTY ONLY

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6-TERMS OF DELIVERY:	Free delivery at consignee's premises including installation.
7-EXCISE DUTY:	Exempted.
8-SALES TAX:	Inclusive of CST/VAT@4%
9-DELIVERY PERIOD:	90 days from the date of receipt of confirmed order.
10-ANNUAL TURNOVER/MONETARY LIMIT:	2006-07 680 Lac
11-PAYMENT TERMS	As per Schedule-B
12-SLAB DISCOUNT CLAUSE:	i) Discount of 1/2% if order is more than 25 lacs of an item for a site ii) Discount of 1% if order is of more than 50 lacs for a site iii) discount of 2% if order is of more than 100 lacs for a site iv) Discount of 3% if order is of more than 200 lacs for a site.
13-PRICES:	FIXED
14-QUANTITY OFFERED:	Monetary Limit: Without Limit
15-MIN. QUANTITY IN SINGLE SUPPLY ORDER:	0
16-STATUS OF RC HOLDING FIRM:	SSI
	The Chief Controller of Accounts, Deptt.

17-PAYING AUTHORITY: of Supply  
16, AKBAR ROAD  
New Delhi -110011

18-INSPECTION AUTHORITY: ADG(Q.A), Jeevan Tara Building, 5 Sansad Marg  
New Delhi

19-QUALITY ASSURANCE OFFICER: Office of Director (Quality Assurance),  
DGS&D,  
E-III, Phase-VII, Industrial Area,  
SAS Nagar  
Mohali  
PUNJAB -160055

20-PLACE WHERE THE STORES ARE TO BE TENDERED FOR INSPECTION: i. 739, Industrial Area, Phase -  
II, Chandigarh - 160002  
ii. 481, Industrial Area, Phase-  
I, Panchkula.

21-R/C IS DDOs OPERATED Yes

22-PACKING & SPECIFICATION see annexure

( )  
Asstt. Director (S) / Section Officer / Dy. Director  
For and behalf of the purchaser named in the Form DGS&D 1001.

All the R/C particulars including prices in respect of individual R/Cs are available on DGS&D website which can be accessed by all.  
The DGS&D website is <http://dgsnd.gov.in>

**RC SPECIFICATION:**

1. SPECIAL CONDITIONS OF CONTRACT

This Rate Contract & supply Orders placed against the rate contract govern by the General Conditions of the Contract as contained in form No. DGS&D 68 ( Revised), & DGS&D 69 Instructions to Tenderers quoting against Tender Enquiries issued by the DGS&D contained in form no. DGS&D 230, DGS&D 239 and DGS&D 1001 amended upto date.

2. GUARANTEE/WARRANTY CLAUSE

a. Solar Lantern, Solar Home Lighting System & Solar Street Lighting System ( incl. Battery ) 24 months from the date of delivery, Installation, whichever is later.

b. PV Module: 10 years (min.) from the date of delivery / installation, whichever is later.

3. Payment terms:-

a. For Solar Lantern and Spare PV Module: 98% against Inspection and delivery to the consignee and balance 2% after acceptance of stores by the consignee and submission of BG for the same amount valid for 2 years and 2 months from the date of acceptance of store by consignee.

b. For Solar Home & Street Lighting System: 90% against inspection and delivery to the consignee and balance 10% after installation commissioning & final acceptance of stores by the consignee and submission of BG for the same amount valid for 2 years and 2 months from the date of acceptance of store by consignee.

4. Terms of delivery: Stores will be delivered free at consignee's premises including freight, forwarding under DGS&D standard transit insurance clause. The purchaser will not pay separately for the insurance charges and it will be contractor's responsibility for the safe arrival of goods in full & good condition.

5. All the item shall be as per latest MNES specification and tenderer shall possess satisfactory test certificate issued by Solar Energy Centre or any other approved testing centre by MNES and same shall also be furnished to the concerned D(QA) at the time of inspection.

6. Octroi Duty/Entry Tax: Normally, materials to be supplied to government Deptt. against government contracts are exempted from levy of town duty, Octroi duty, terminal tax and other levies of local bodies. The Local town/Municipal body regulations at times, however, provide for such exemption only on production of such exemption certificate from any authorised officer. Wherever required, Contractor should obtain the exemption certificate from the purchase officer or indentor concerned, to avoid payment of such local taxes of duties. In case State/Local town/Municipal body regulations do not provide for such exemptions the octroi duty/Entry tax shall be payable at actuals against documentary evidence of having paid such

levies.

SCHEDULE `D

SPECIAL INSTRUCTIONS - TO RC HOLDERS

1. Rate Contract holders are advised that before entertaining the supply order(s) they should ensure the availability of following certificates from DDOs.

a) They are Central Government Department drawing funds from Consolidated Fund of India.

b) The expenditure involved for the purchase has received the sanction of the competent financial authority.

c) The funds are available under the proper head in the sanctioned budget allotment for the year.

d) They have been fully authorized by the Department to sign the supply order and incur the liability in respect of the stores being ordered.

( SURENDRA SINGH )

ASSISTANT DIRECTOR (S)

For and on behalf of the purchaser named in the form DGS&D-1001



**SCHEDULE - C**

**LIST OF PARALLEL RATE CONTRACT FOR Solar Lighting System**

Sr.No.	NAME & FULL ADDRESS OF FIRM	R/C NO & DATE
1	MACHINOCRAFT 7/14, Krutarth House Society, Pune-Satara Road,Pune- 411037  MAHARASHTRA 411037	Solarlight/IT-2/RC- D3020000/1008/82/DA463/0375 20-NOV-07
2	SUN ENEGRY SYSTEMS Plot No-45, Phase-I, GIDC Estate, Vithal Udyog Nagar, Anand GUJARAT 388121	Solarlight/IT-2/RC- D3020000/1008/82/03454/0368 20-NOV-07
3	HITECH SYSTEMS A-31 Nirala Nagar Lucknow UTTAR PRADESH 226020	Solarlight/IT-2/RC- D3020000/1008/82/01598/0381 20-NOV-07
4	ABHISHEK INDUSTRIES Lower Vidyapati Nagar, Kanke Road Ranchi JHARKHAND 834008	Solarlight/IT-2/RC- D3020000/1008/82/DA650/0364 20-NOV-07
5	SUNRISE TECHNOLOGY A/38, Electronic Zone, GIDC Sector- 25, Gandhi Nagar, Gujarat Ph. No. 079-23246054 / 23246079  GUJARAT 380006	Solarlight/IT-2/RC- D3020000/1008/82/DA318/0379 20-NOV-07
6	VAISHNAVI SOLAR 45/29-1, 1st Floor, Gubbanna Industrial Estate, 6th Block, Rajajinagar, Bangalore- 560010 E-mail-vaishnavisolar@gmail.com BANGALORE KARNATAKA 560010	Solarlight/IT-2/RC- D3020000/1008/82/DA343/0376 20-NOV-07
7	SUNTIME ENERGY LIMITED Central Market, IInd Floor, Lajpat Nagar - II	Solarlight/IT-2/RC- D3020000/1008/82/O0165/0377 20-NOV-07

7	NEW DELHI DELHI 110024	Solarlight/IT-2/RC- D3020000/1008/82/O0165/0377 20-NOV-07
8	VIMAL ELECTRONICS Plot E-49 , GIDC , Electronic Estate, Sector-26 Gandhinagar GUJARAT 382028	Solarlight/IT-2/RC- D3020000/1008/82/OA091/0378 20-NOV-07
9	CENTRAL ELECTRONICS LIMITED 781, D.B. Gupta Road, Karol Bagh New Delhi DELHI 110005	Solarlight/IT-2/RC- D3020000/1008/82/03533/0367 20-NOV-07
10	TILAK INTERNATIONAL (SIGNAL) J-1/162A(IInd)Floor Rajouri Garden New Delhi DELHI 110027	Solarlight/IT-2/RC- D3020000/1008/82/OA218/0365 20-NOV-07
11	RITIKA SYSTEMS PRIVATE LIMITED, C-22/18, Sector-57,NOIDA-201301 NOIDA UTTAR PRADESH 201301	Solarlight/IT-2/RC- D3020000/1008/82/01227/0366 20-NOV-07
12	SUNGRACE ENERGY SOLUTUIONS PVT. LTD 12-13-628,Nagarjuna nagar, Tarnaka, Hyderabad Hyderabad ANDHRA PRADESH 500017	Solarlight/IT-2/RC- D3020000/1008/82/NA436/0369 20-NOV-07
13	SU SOLARTECH SYSTEMS (P) LTD. SCO 184, Sector 7-C, Chandigarh CHANDIGARH 160019	Solarlight/IT-2/RC- D3020000/1008/82/02509/0380 20-NOV-07
14	RASHMI INDUSTRIES No. 60 & 61, Hongasandra, Begur Road Bangalore KARNATAKA 560068	Solarlight/IT-2/RC- D3020000/1008/82/DA323/0382 20-NOV-07
15	SUN TECHNICS ENERGY SYSTEMS PVT.LTD.,	Solarlight/IT-2/RC- D3020000/1008/82/03696/0373 20-NOV-07

15	FF-06-BR1, Parsvnath Plaza, Block G, Plot # 75B, Sector-27, D.M.Road, Noida- 201301, Ph. 91 120 435 7901, Mob. 09810376321 Fax- 91 120 435 7900, Email- u.shome@suntechnics.com	Solarlight/IT-2/RC- D3020000/1008/82/03696/0373 20-NOV-07
	KARNATAKA            560038	
16	TATA BP SOLAR INDIA LTD. Tata BP Solar India Ltd. 70-74, UGF, World Trade Centre, Barakhamba Lane , New Delhi New Delhi DELHI                    110001	Solarlight/IT-2/RC- D3020000/1008/82/DA326/0374 20-NOV-07

NOTE:

(1) Before placing supply order, DDOs are advised to check with DGS&D or on the website whether any further RCs have been awarded or amendments to Rate Contract have been issued

(2) All the R/C particulars including prices in respect of individual R/C's are available on DGS&D website, which can be accessed by all. The access code of DGS&D website is <http://dgsnd.gov.in>

## ANNEXURE

1. Spare PV Module shall be supplied with appropriate cable, connectors and soldering terminals.
2. Solar Lantern shall comprise of lead acid battery , PV module, battery box, compact fluorescent lamp and shall be complete with luminaire, control electronics, interconnecting cables/ wires and operating instruction / maintenance manual.
3. Solar Home Lighting System shall comprise of lead acid battery , PV module, module mounting hardware , battery box, compact fluorescent lamp and fan (where specified) and complete with luminaire, control electronics, interconnecting cables/ wires and operating instruction / maintenance manual.
4. Solar Street Lighting System shall comprise of lead acid battery , PV module, pole, module mounting hardware , battery box, compact fluorescent lamp and complete with luminaire, control electronics, interconnecting cables/ wires and operating instruction / maintenance manual.
5. All the item shall be as per MNES specifications of 2005-2006 and tenderer shall possess satisfactory test certificate issued by Solar Energy Centre or any other approved testing centre of MNES and same shall also be furnished to the concerned D(QA) at the time of inspection.
6. Thickness of Battery Box for Home Light System and Street Lighting System shall be minimum 0.70 mm made up of MS Sheet.
7. For Street Lighting System, module mounting hardware shall be adjustable for sun orientation . The pole shall be either in one piece with uniform diameter of 76 mm OD or swaged type with 76 mm OD in lower portion and 60 mm OD in upper portion or 76 mm OD throughout, made up of MS duly primed (2 coats) and painted in silver ash hammertone colour (or as chosen by DDO). The pole shall have suitable arrangement for grouting and length of the pole above ground shall not be less than 4.0 meters.
8. PV Modules manufacturer should be MNES approved.
9. They shall have a testing facility to check the power output of PV module, calibrated modules with set up for measuring sun intensity, voltmeter, ammeter, D.C power supplies, multimeter, loading facility for charge controller, H.V & I.R tester etc.
10. The Battery shall be of standard makes of Panasonic, Exide Base, Yuasa, Prestolite, HBL nife, Amarraja, Hitachi, CSB, Kamatsu Tata BP or DGS&D registered battery.
11. CFL Lamps shall be of standard makes of Osram, Philips, Bajaj, Phonix, avells, Anchor, Surya or DGS&D registered make.

### SPECIFICATION FOR SOLAR PHOTOVOLTAIC SYSTEM (MNES 2005-2006 SPV PROGRAMME)

#### SOLAR LANTERN

##### 1. Definition:

A Solar Photovoltaic Lantern is a lighting system consisting of a lamp,

battery and electronics all placed in a suitable housing, made of metal, plastic or fiber glass and a PV module. The battery is charged by electricity generated through the PV module. The lantern is basically a portable lighting device suitable for indoor or outdoor lighting covering a full range of 360 degrees. A lighting device which provides only unidirectional lighting will not be classified as a solar lantern in the present context.

2. Duty Cycle:

The solar lantern should provide a minimum of three hours of lighting per day under average daily solar radiation conditions of 5 kWh/sq.m. on a horizontal surface. The actual duration of lighting may vary depending on the location, season, etc.

3. Models:

The solar lantern should conform to one of the following 12V models .

(a) Model IIA

Lamp ----- CFL 7W ,  
Battery Capacity At C/20 Rate---- 12V,7.00AH,  
PV Module Rating----- 10.0 TO 11.9 Wp

(b) Model IIB

Lamp ----- CFL 7W ,  
Battery Capacity At C/20 Rate --- 12V,7.00AH,  
PV Module Rating ----- 12.0 TO 14.0 Wp

4. Lamp:

- (a) The lamp will be of compact fluorescent (CFL) type with a rating of 7W.
- (b) For 4-Pin type CFLs, a suitable pre-heating circuit must be provided.
- (c) The lamp should preferably be mounted in a base up configuration.
- (d) The light output should be 370 +/- 5% lumen for a 7W lamp (see also (c) of 6.

5. Battery:

- (a) The battery will be sealed maintenance free lead acid type.
- (b) The capacity of the battery will be a minimum of 7.0 AH at 12 V at C/20 discharge rate at 20C.
- (c) Eighty percent of the rated battery capacity should be between the low voltage and high voltage cut/off points.

6. Electronics:

- (a) The inverter will be of quasi sine wave/sine wave type with a crest factor less than 1.7 and the frequency in the range of 20-35 KHz. Half-wave operation is not acceptable.
- (b) The overall efficiency of the control electronics should be at least 80%.
- (c) No blackening or reduction in the lumen output by more than 10% should be observed after 1000 ON/OFF cycles (two minutes ON and four minutes OFF is one cycle).
- (d) The idle current (i.e. the current consumed when the lamp is switched OFF and no charging is in progress) should not be more than 1 mA.
- (e) The PCB containing the electronics should be capable of solder free installation and placement.
- (f) Electronics should operate at 12 V and should have temperature compensation for proper charging of the battery through out the year.

7. PV Module:

- (a) The wattage range of the PV modules will be 10.0-11.9 Wp for Model IIA & 12.0-14.0 Wp for Model IIB & it should be at 16.40 Volts for both the Models (under standard test conditions (STC)). The open circuit voltage of the PV modules under STC should be at least 21.0 Volts for all 12 V Models.
- (b) The module should preferably have an arrangement (stand) for mounting at the optimum angle in the direction facing the sun.
- (c) In case of thin film solar cell modules, the specified values refer to the power output after the initial degradation.
- (d) The terminal box on the module should have a provision for opening for replacing the cable if required.
- (e) A strip containing the following details should be laminated inside the module so as to be clearly visible from the front side:
  - (i) Name of the Manufacturer or distinctive Logo.
  - (ii) Model or Type No.
  - (iii) Serial No.

8. Electronic Protections:

- (a) Adequate protection is to be incorporated under no load conditions (e.g. when the lamp is removed and the lantern is switched ON).
- (b) Battery cut offs & reconnections should be provided to protect it against overcharge and deep discharge conditions.
- (c) A fuse should be provided to protect against short circuit conditions.
- (d) A blocking diode, preferably a Schottky diode should be provided as part of the lantern electronics to prevent reverse flow of current through the PV module in case such a diode is not provided with module itself.
- (e) Full protection against open circuit, accidental short circuit and reverse polarity should be provided.

9. Other features:

- (a) The lantern should be provided with 2 LED indicators, a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow when the battery is actually being charged.
- (b) A good reliable switch suitable for DC use is to be provided on the lantern. A cable at least 5 meters long should be provided for inter-connection between the module and the lantern.
- (c) The following details should be marked indelibly on the lantern:
  - (i) Name of the Manufacturer or Distinctive Logo.
  - (ii) Model Number (this refers to Models indicated below.)
  - (iii) Serial Number.
- (d) An Operation, instruction and Maintenance Manual in English and the local language should be provided with the solar lantern.  
The following minimum details must be provided in the Manual.
  - (i) About Photovoltaics
  - (ii) About solar lantern.
  - (iii) About PV module.
  - (iv) About CFL
  - (v) About battery.
  - (vi) Clear instructions about mounting of PV module.
  - (vii) About electronics.
  - (viii) About charging and significance of indicators.
  - (ix) DO's and DONT's.
  - (x) Clear instructions on regular maintenance and trouble shooting of the lantern.
  - (xi) Name and address of the person or service Centre to be contacted in case of failure or complaint.

- (e) Components and parts used in the solar lantern should conform to the latest BIS specifications, wherever such specifications are available and applicable.
- (f) The PV module will be warranted for a minimum period of 10 years from the date of supply and the lantern (including the battery) will be warranted for a minimum period of two years from the date of supply. The Warranty Card to be supplied with the system must contain the details of the system supplied, as given in ANNEXURE "A". The manufacturers can also provide additional information about the system and conditions of warranty as necessary.
- (g) Additional features such as a small white LED which function as a night lamp or a socket for powering another appliance such as a fan or radio may be provided in the lantern. These are however purely optional. If such features are provided, they should not interfere with the independent switching on and off of the lantern.

SOLAR HOME LIGHT SYSTEM

1. Definition:

A solar home system aims at providing solar electricity for operating lights and/or fan or energizing a DC operated portable TV set for specified hours of operation per day.

2. Models:

(a) Model 1 (1 Light Point)

PV Module ----- 1 X 18Wp under STC  
 Lamp ----- 1 X CFL (9W or 11W)  
 Battery ----- 1 X 12 V, 20 AH Tubular Plate low maintenance  
 type lead acid battery  
 Other Components ----- Control electronics ,module mounting hardware ,  
 battery box,inter-connecting wires/ cables ,  
 switches operation instruction and maintenance  
 manual.

(b) Model 2 (2 Lights)

PV Module ----- 1 X 37Wp under STC  
 Lamp ----- 2 X CFL (9W or 11W)  
 Battery ----- 1 X 12 V, 40 AH Tubular Plate low  
 maintenance type lead acid battery  
 Other Components ----- Control electronics ,module mounting hardware ,  
 battery box, inter-connecting wires/ cables ,  
 switches operation instruction and maintenance  
 manual.

(c) Model 3 (1 Light and 1 Fan)

PV Module ----- 1 X 37Wp under STC  
 Lamp ----- 1 X CFL (9W or 11W)  
 Fan ----- 1 X DC Fan ( with wattage less than 20 W)  
 Battery ----- 1 X 12 V, 40 AH Tubular Plate low maintenance type  
 lead acid battery  
 Other Components ----- Control electronics ,module mounting hardware ,  
 battery box,inter-connecting wires/ cables ,  
 switches operation instruction and maintenance

manual.

(d) Model 4 (2 Lights and 1 Fan)

PV Module ----- 2 X 37Wp or 1 X 74Wp under STC  
Lamp ----- 2 X CFL (9W or 11W)  
Fan ----- 1 X DC Fan ( with wattage less than 20 W)  
Battery ----- 1 X 12 V, 75 AH Tubular Plate low maintenance type  
lead acid battery  
Other Components ----- Control electronics ,module mounting hardware ,  
battery box,inter-connecting wires/ cables ,  
switches operation instruction and maintenance  
manual.

(e) Model--5 (4 Lights )

PV Module ----- 2 X 37 Wp or 1 X 74 Wp under STC  
Lamp ----- 4 X CFLs (9W or 11W)  
Battery ----- 1 X 12 V, 75 AH Tubular Plate low  
maintenance type lead acid battery  
Other Components ----- Control electronics ,module mounting hardware ,  
battery box,inter-connecting wires/ cables ,  
switches operation instruction and maintenance  
manual.

Note :

- (a) All models will have a socket to provide power for a 12V DC TV set which is purchased separately.
- (b) A small white LED may be provided as an optional feature with an independent switch.

3. Duty Cycle:

Model	Average Hours of Operation/Day
Model 1	1 Light 3-4 Hours.
Model 2	2 Lights, 3-4 Hours.
Model 3	1 Light, 1-2 hours, 1 Fan- 1-2 hours.
Model 4	2 Lights, 2-3 hours, 1 Fan- 2-3 hours.
Model 5	4 Lights, 3-4 hours.

4. Lamps:

- (a) The lamps will be of compact fluorescent (CFL) type, either 4-Pin or 2 Pin types with rating of 11W. For the 4-Pin type CFLs a suitable pre-heating circuit must be provided.
- (b) The light output from the lamps should be around 600 +/- 5% lumens (for 9W CFL) and 900 +/- 5% lumens (for 11W CFL). Also please see (c) of 6 below.
- (c) The lamps should be housed in an assembly suitable for indoor use, with a reflector on its back. While fixing the assembly, the lamp should be held in a base up configuration.

5. Battery:

- (a) The battery will be of flooded electrolyte type, positive tubular plate, low ,maintenance lead acid battery.
- (b) The battery will have a minimum rating of 12V, 20 or 40 or 75 Ah at C/10 discharge rate depending on Model.
- (c) 75% of the rated capacity of the battery should be between fully charged



& load cut off conditions.

6. Electronics:

- (a) The inverter should be of quasi sine or full sine wave type with frequency in the range of 20-35 KHz. Half wave operation is not acceptable.
- (b) The total electronic efficiency should be at least 80%.
- (c) No blackening or reduction in the lumen output by more than 10% should be observed after 1000 ON/OFF cycles (two minutes ON followed by four minutes OFF is one cycle.)
- (d) The idle current consumption should not be more than 10 mA.
- (e) Electronics should operate at 12 V and should have temperature compensation for proper charging of the battery through out the year.
- (f) Necessary lengths of wires/cables, switches suitable for DC use and fuses should be provided.

7. PV Module(s):

- (a) The PV module(s) shall contain crystalline silicon solar cells.
- (b) The power output of the module(s) under STC should be a minimum of 18W or 37W or 74W. In case of Model 4 & 5 either two modules of 37 W each or one module of 74W should be used.
- (c) The operating voltage corresponding to the power output mentioned above should be 16.4 V
- (d) The open circuit voltage of the PV modules under STC should be at least 21.0 Volts.
- (e) The terminal box on the module should have a provision for opening for replacing the cable, if required.
- (f) A strip containing the following details should be laminated inside the module so as to be clearly visible from the front side:
  - (i) Name of the Manufacturer or distinctive Logo.
  - (ii) Model or Type No,
  - (iii) Serial No.

8. DC Fan:

The wattage of the fan should not be more than 20 Watts and it should operate at 12V DC.

9. Electronic Protections:

- (a) Adequate protection is to be incorporated under no load conditions e.g. when the lamps are removed and the system is switched ON.
- (b) The system should have protection against battery overcharge and deep discharge conditions.
- (c) Fuses should be provided to protect against short circuit conditions.

10. Mechanical Components:

- (a) Metallic frame structure(with corrosion resistance paint) to be fixed on the roof of the house to hold the SPV module(s). The frame structure should have provision to adjust its angle of inclination to the horizontal between 0 and 45, so that it can be installed at the specified tilt angle.
- (b) A vented metallic box with acid proof and corrosion resistance paint .for housing the storage battery indoors should be provided. The box can be of injection moulded plastic or wooden for home lighting models 1,2 and 3 only.

11. Other Features:

- (a) The system should be provided with 2 LED indicators, a green light to

indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow only when the battery is actually being charged.

- (b) There will be a Name Plate on the system which will give :
  - (i) Name of the Manufacturer and Distinctive Logo.
  - (ii) Serial Number.
- (c) Components and parts used in solar home systems should conform to the latest BIS specifications, wherever such specifications are available and applicable.
- (d) The PV module(s) will be warranted for a minimum period of 10 years from the date of supply and the solar home system (including the battery) will be warranted for a period of two years from the date of supply. The Warranty Card to be supplied with the system must contain the details of the system supplied, as given in the ANNEXURE "A". The manufacturers can also provide additional information about the system and conditions of warranty as necessary.
- (e) An Operation, Instructions and Maintenance Manual in English and the local language should be provided with the solar home system:  
The following minimum details must be provided in the Manual :
  - (i) About Photovoltaics.
  - (ii) About solar home system-its components and expected performance.
  - (iii) About PV module.
  - (iv) About CFL.
  - (v) About battery.
  - (vi) Clear instructions about mounting of PV module(s).
  - (vii) About electronics.
  - (viii) About charging and significance of indicators.
  - (ix) DO's and DONT's.
  - (x) Clear instructions on regular maintenance and trouble shooting of solar home system.
  - (xi) Name and address of the person or service centre to be contacted in case of failure of components.

#### SOLAR STREET LIGHTING SYSTEM

##### 1. Definition:

A stand alone solar photovoltaic street lighting system comprises a compact fluorescent lamp lead acid battery, PV module(s), control electronics, inter-connecting wires/cables, Module mounting hardware, Battery box, Operation instruction and maintenance manual.

##### 2. Duty Cycle:

The system should be designed to automatically switch ON at dusk, operate throughout the night and automatically switch OFF at the dawn, under average daily insolation of 5 KWh/sq.m. on a horizontal surface.

##### 3. Lamp:

- (a) The lamp will be of compact fluorescent (CFL) type, either 4-Pin or 2 Pin type, with a rating of 11W. For the 4-Pin CFL, adequate pre-heating circuit must be provided.
- (b) The light output from the lamp should be around 900+/- 5% lumens. Also please see (c) of 5 given below.
- (c) The lamp should be housed in a weather proof assembly suitable for outdoor use with a reflector on its back. While fixing the assembly, the lamp should be held in a base up configuration.

##### 4. Battery:

- (a) Flooded electrolyte type positive tubular plate, low maintenance lead acid battery.
  - (b) The battery will have a minimum rating of 12V 75 Ah (at C/10) discharge rate.
  - (c) 75% of the rated capacity of the battery should be between fully charged & load cut off conditions.
5. Electronics:
- (a) The inverter should be of quasi sine wave or full sine wave type with frequency in the range of 20-35 KHz. Half wave operation is not acceptable.
  - (b) The total electronic efficiency should be at least 80%.
  - (c) No blackening or reduction in the lumen output by more than 10% should be observed after 1000 ON/OFF cycles (two minutes ON followed by four minutes OFF is one cycle).
  - (d) The idle current consumption should not be more than 10 mA.
  - (e) Electronics should operate at 12 V and should have temperature compensation for proper charging of the battery through out the year.
  - (f) Necessary length of wires, cables and fuses should be provided.
  - (g) The PV module will be used to sense the ambient light level for switching ON and OFF the lamp.
6. PV Module(s):
- (a) The PV module(s) shall contain crystalline silicon solar cells.
  - (b) The power output of the module(s) under STC should be a minimum of 74 W. Either two modules of minimum 37W output each or one module of 74W output should be used.
  - (c) The operating voltage corresponding to the power output mentioned above should be 16.4 V.
  - (d) The open circuit voltage of the PV modules under STC should be at least 21.0 Volts.
  - (e) The terminal box on the module should have a provision for opening for replacing the cable, if required.
  - (f) A strip containing the following details should be laminated inside the module so as to be clearly visible from the front side.
    - (i) Name of the Manufacturer or Distinctive Logo
    - (ii) Model or type no.
    - (iii) Serial No.
7. Electronic Protections:
- (a) Adequate protection is to be incorporated under no load conditions e.g. when the lamp is removed and the system is switched ON.
  - (b) The system should have protection against battery overcharge and deep discharge conditions.
  - (c) Fuses should be provided to protect against battery overcharge and deep discharge conditions.
  - (d) A blocking diode should be provided as a part of the electronics to prevent reverse flow of current throughout the PV module(s), in case such diode is not provided with the solar module(s).
  - (e) Full protection against open circuit accidental short circuit and reverse polarity should be provided.
8. Mechanical Hardware::
- (a) A metallic frame structure (with corrosion resistance paint) to be fixed on the pole to hold the SPV module(s). The frame structure should have provision to adjust its angle of inclination to the horizontal between 0 and 45 so that the module(s) can be oriented at the specified tilt angle.

- (b) The pole should be made of mild steel pipe with a height of 4 meters above the ground level, after grouting and final installation. The pole should have the provision to hold the weather proof lamp housing. It should be painted with a corrosion resistant paint.
- (c) A vented acid proof and corrosion resistant painted metallic box for outdoor use should be provided for housing the battery.

9. Other Features:

- (a) The system should be provided with 2 LED indicators, a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow only when the battery is actually being charged.
- (b) There will be a Name Plate on the system which will give :
  - (i) Name of the Manufacturer or Distinctive Logo;
  - (ii) Serial Number.
- (c) Components and part used in the solar street lighting systems should conform to the latest BIS specification. Wherever such specifications are available and applicable.
- (d) The PV module(s) will be warranted for a minimum period 10 years from the date of supply and the street lighting system (including the battery) will be warranted for a period of two years from the date of supply. The Warranty Card to be supplied with the system must contain the details of the system supplied as given in the ANNEXURE "A" . The manufacturers can also provide additional information about the system and conditions of warranty as necessary.
- (e) An Operation, Instruction and Maintenance Manual, in English and the local language should be provided with the solar street lighting system. The following minimum details must be provided in the Manual :
  - (i) About Photovoltaics
  - (ii) About solar street lighting system-its components and expected performance.
  - (iii) About PV module.
  - (iv) About CFL.
  - (v) About battery.
  - (vi) Clear instructions about erection of pole and mounting of PV module and lamp housing assembly on the pole.
  - (vii) About electronics.
  - (viii) About charging and significance of indicators.
  - (ix) DO's and DONT's.
  - (x) Clear instructions on regular maintenance and trouble shooting of the solar street lighting system.
  - (xi) Name and address of the contact person in case of non-functionality of the solar street lighting system.

ANNEXURE- " A"

FORMAT FOR WARRANTY CARD TO BE SUPPLIED WITH EACH SOLAR LANTER,  
SOLAR HOME SYSTEM & STREET LIGHTING SYSTEM.

1. Name & Address of the Manufacturer/Suppler of the system.
2. Name & Address of the Purchasing Agencies.
3. Date of supply of the system.
4. Details of PV Module(s) supplied in the system

Make (Name of the manufacturer)  
Model  
Serial No(s)  
Wattage of the PV Module(s) under STC  
Warranty valid upto.

5. Details of Battery

Make(Name of the manufacturer)  
Model  
Batch/Serial No(s)  
Rated V & AH capacity at C/20/C/10 rate at 20C

6. Details of Electronics & other BOS items

Make(Name of the manufacturer)  
Model  
Serial No(s)  
Warranty valaid upto

7. Designation & Address of the person to be contacted for claiming Warranty obligations.

( Signature )

Name & Designation

Name & Address of Manufacturer/Supplier

(SEAL)

Place & Date

(During the warranty period MNES/State Agencies/users reserve the right to cross check the performance of the systems with the minimum performance levels specified in the MNES specifications)

Spare PV Module For Solar Lighting System as per MNES Specification

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Specification : AS per General Technical Requirements.

Solar Lantern ( MNES Specification)

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Specification : AS per General Technical Requirements.

Solar Home Light System With Structure ( MNES Specification)

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Specification : AS per General Technical Requirements.

Solar Street Light System With Mounting Structure & Pole ( MNES Specification)

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Specification : AS per General Technical Requirements.