



PVGreenCard

Promoting safe quality Solar PV installations

Equipment List and Setup Instructions

Material for PV courses

This is the list of the material required for the practical portion of the SAPVIA Solar PV Installer training. It is expected that any training provider wanting to offer this training will have a training classroom equipped with desks and chairs, a projector, flip-chart etc. To conduct the theory portion of the training.

#	Material	Photo	Description
1	Training Roof		Ground standing roof with usual structure (rafter, tiles...). Sufficient roof-area to mount the system. Tilted angle 10° to 30° recommended
2	Mounting System		Complete system, including all necessary part (hooks, rails, clamps...) and documentation
3	4 PV Modules		Standard modules 60 or 72 cells
4	PV-cable		Recommendation: PV1-F approved or similar, optional red/blue/black

5	PV connectors		Same manufacturer as in use at the modules, recommendation: MC4
6	Crimping tool		Provided by the original plug manufacturer or a third party manufacturer if suitable
7	DC Clamp, 1000V AC/DC, CAT III		Current should always be measured only with a clamp to avoid arcing in case of short circuit. Don't use usual multi-meter for measuring DC current!
8	Electrician tools		All usual tools an electrician needs for his work (screwdriver, side cutter...)
9	Measuring tape		For training an ordinary ruler is reasonable, on site a 5m tape or a distance meter is recommended

10	Cutting tool: saw or angle grinder		Saw is more accurate, angle grinder is most common
11	Milling machine or grinder		Milling machine is more accurate, angle grinder is most common
12	Drilling machine		If reasonable
13	Wooden layer		to adapt height of hook, durable material
14	Cable ties		UV resistant recommended. If reasonable also with clamp to attach to the frame
15	Flexible duct hose (convoluted tubing, "sprague")		As additional UV protection for cables directly exposed to the sun

16	Ventilation tiles (if available)		Inlet for DC cables to building
17	Safety shoes, appropriate clothes		Shoes with metal cap, reinforced sole
18	Safety gloves, protective glasses		As mentioned in the safety regulations for all tools in use
19	Hard hat / Bump caps		For training bump caps are recommended, on site hard hats may be compulsory

Safety measures:

All safety precaution regarding OHS must be fulfilled (fire extinguisher, first aid kit...)

For the practical part on a small training roof standing on the ground no scaffold or fall arrest system is necessary.

Inverter, electrical installation

An example for an AC-installation is recommended to discuss the installation and the necessary measures. In the one week course the mounting of the complete installation including the AC side is not possible due to limited time for that.

An inverter (min 1kVA rated power, inverter according NRS 097, e.g. listed on the Cape Town municipality home page), the DC cable between generator and inverter laid in cable ducts, the AC cable to the meter and the meter cabinet must be installed according SANS 10142.

Additional hints

All necessary material and tools for the mounting systems should be discussed with the system manufacturer. A problem using the same material for several courses: components of the system may be damaged after a while (this is a problem especially with roof tiles, rafters, some flat top roof systems or roof integrated systems). Especially the rafters are damaged after a while due to the screws. Also screwing into profiled sheeting will damage the sheeting within short time. Either it is necessary to renew the damaged components frequently or to find another solution.

Nice to have

The following material is recommended for additional training topics.

A digital camera and an angle meter are used for on-site survey. A smart phone with corresponding apps is suitable. Example free PV-Sol app.

Second DC clamp: String currents are below 10A, DC main line currents for MW installations can be > 100A. A clamp that can measure high current has a higher uncertainty for low current. Therefore two different clamps may be better. DC Voltage measurement must be at least 1000V.

Infrared camera, Isolation meter and/or EN 62446 meter, Earth resistant meter. If measurement according EN 62446 is recommended an isolation meter or EN 62446 meter is compulsory.

Mounting

Space for flat top roof mounting, mounting system for flat top roofs. Material for matting to preserve the roofing should be available e.g. with additional aluminium layer to prevent plasticizer to dissolve from the matting material.



Consider also requirements in the mounting system manual.