

# PEG<sup>®</sup> PV substructure

FAQ for PEG



Reaching the lowest cost of electricity  
with a revolutionary new PV plant technology

### **What is the standard corrosion protection for PEG?**

- at the moment: rods min. 70µm hot dip galvanized, plates 20 µm pre-galvanized
- a short instruction with specifications on how to perform a soil test is available

### **What site conditions are suitable for PEG?**

- The PEG system can be installed at slopes up to 4.5° (7.9%)
- The rod need to be installed differently depending on the slope occurrence.
- 0 – 2° (3%): perpendicular rod installation to horizontal plate
- 2° – 4.5° (7.9%): vertical installation to the ground.
- for more information ask for our “PEG site requirement”

### **Which tools/machinery is needed?**

- (hydraulic) drill hammer (combined impact drill could be used with rocky ground)
- Pressing tool for pressing the plates, pictures available
- recommended tool list is described in installation manual

### **Which solar modules can be used with PEG?**

- Framed modules, approved for corner clamping
- Please double-check installation manual of module for further information (extract of modules approved for 2.400 PA with corner clamping available)
- In general we prefer modules with an inner frame width of 28, 30 or 35 mm (compatible to standard PEG plates)
- List of approved modules is available for sharing

### **How do you earth the modules?**

- The middle clamp is a piercing clamp of Jurchen Technology. It has small piercing points ensuring the earthing of the module via the plate to the ground.

### **What is the general PEG layout?**

- In general PEG should be built in blocks without any/or almost none terracing. Blocks can vary between 10x10 m minimum and 30x30 m maximum (thermal extension). Standard layouts available
- Thermal extension shall not exceed 50 mm

### **What about transport costs?**

- ~1,2 MW are delivered in 40' Container;
- 1 MW PEG weighs approx. 12-14 tons (depending on solar module, 60 or 72 cells)

### **What is the standard warranty on PEG?**

- 10 years limited warranty and 25 years design warranty

### **What is a standard cabling system for PEG?**

- East-West: following the gable single side solar cable system (up to 10 cables)
- North-South: following the maintenance corridor collecting cable system (up to 56 cables)
- For special inquires other systems are available – depending on projects
- Pictures available

## Why should we buy PEG of Jurchen Technology GmbH? Are there systems available on the market which are comparable?

- Jurchen Technology GmbH holds the patents of PEG in a lot of countries.
- List of patents available
- Light weight construction, reducing costs for material, transportation, machinery, work force on site

## How much boundary area do you have with PEG?

2-3 modules are part of the boundary, everything else field section

## How about pull-out tests for PEG?

- Besides the easier mounting of PEG and the use of less heavy machinery, the needed pull-out tests are easier to complete. Pull out test guidance is available for sharing
- Manual/pictures available

Here one example for pull-out test values for a project in Germany:

### site:

region:	Bavaria
height above sea:	460 m above sea level
wind zone:	1
snow zone:	2

### minimum value for pull-out test with at least 4 tests:

module 60 cells:	short rod 45 kg
	long rod 52 kg
module 72 cells:	short rod 44 kg
	long rod 49 kg

## Is PEG suitable for any wind and snow zone?

- We have done a standard static calculation for PEG with wind zone 3/snow zone 2 (according to German norm DIN EN 1991-1-3) and consequently PEG is approved for a maximum load of 1.350 PA in general.
- In Australia PEG is suitable and statically approved for wind velocities up to 135 mph (60,3m/s); in Chile there is a static approval for wind velocities of 35m/s as well as snow loads of 35 kg/m<sup>2</sup>.
- For differing values just contact Jurchen Technology GmbH

## What about seismic loads?

PEG is approved for high seismic loads, e.g. seismic zone 3 (Chile)

## What about the inverters for a PEG plant? Are there mounting devices available?

There are mounting devices available



### **What is the yield of a PEG plant vs. standard south oriented systems?**

- The closer we come to the equator, the better the yield of PEG. Please feel free to do a PVSys analysis for your plant.
- Please keep in mind that there is one PEG plant in Germany where we have to install another string inverter as the plant outperformed the installed inverters and the power output had to be limited.
- Above that, with PEG you have highest area utilization as the distances between the blocks are kept to a minimum compared to standard structures. Therefore you will be able to install more modules on the field, i.e. the yield is higher than with a standard south structure.

### **When does the customer receive the static calculation for the project?**

Static calculation will be done after order receipt. A standard static for 60 and 72 cell modules for load values (Germany) has been done.

### **Can we use PEG for FirstSolar FS6 modules as well?**

PEG has also been designed for FirstSolar FS6 modules as Jurchen Technology is an ecosystem partner for FirstSolar. We are in the approval phase with FirstSolar at the moment.

### **Can we install PEG with rocky ground?**

- Yes, just pre-drill the PEG ramming holes with a standard drill hammer (16 or 18) or alternatively you could drill a 25 mm hole and inject anchor grout.
- Pictures available

### **What is the estimated mounting and installation time of PEG**

- 1,2 kWp/man-hour can be calculated (trained workers with good soil conditions increase the kWp/man-hour)
- 1,2 kWp/man-hour include the following works:
  - ramming of PEG rods
  - complete installation of substructure
  - mounting and cabling of modules
  - DC-cabling connection up to inverter
  - Connect cabling up to inverter exit (DC cabling material not included)
- 1 MW-team consists of 6 workers (2 for ramming, 2 for pressing the plates, 2 for mounting the modules including DC cabling connection)
- Average daily rate
- For ramming with an hydraulic dumper trained service men can ram approximately 300-400 rods per day, 640 pressings can be done on one day, 320 modules can be mounted per day. These rates are based on a 750 kW PEG plant with 5-6 men on site

## Temperature measurements

With the existing PEG installation there have never been any ventilation problems. Cooling is similar to traditional south faced systems.

Here are results of temperature measurements done at one of our PEG installations:

Outdoor temperature:	30°
Edge area of a JT-PEG block under the module:	38°
Center of a JT-PEG block under the module:	40.5°
Temperature on the module surface, upper side:	42° (possibly due to the cloudy sky, but measured for several minutes)
Temperature on the module surface, underside:	45°

We assume here that the temperature under the modules in summery weather (approx. 25 - 35°) is approx. 7 -15° higher than the outside temperature.

## Lumen measurement

Results of lumen measurement under PEG block (cloudy day): 600 lm

## What kind of plants do you recommend planting in order to limit mowing intervals to a minimum?

Based on the lumen measurement and our experience with PEG there is still vegetation below the PEG blocks. In order to avoid uncontrolled growth we recommend to plant low growing clover plants, such as white clover. These also increase the nitrogen percentage in the soil leading to less weed and therefore less mowing intervals.

## How about mowing the field?

- In general there is no need to mow the "inner" section below the solar modules.
- In our experience you only need to mow in the boundary areas, using e.g. Spider, agria or RoboFlail mini  
<https://www.youtube.com/watch?v=iC1uMLMLgj8>  
<https://www.youtube.com/watch?v=5IJ2gBQFJCU>  
<https://www.youtube.com/watch?v=9kAJujtF4-Y>
- Additionally, motorized hand scissors can be used. Also an autonomous driving robot will be completed by March 2019

## How about cleaning the system?

- Qleen solution (manual available)
- Gal-IN Solution (Belectric developed, Weight of cleaning system: 16 kg; 1400 liters of water per MWp; two workers are required for 15 hours work (meaning 2 working days) to clean 5 MWp)

## How about O&M works on the modules? How do I exchange defective modules?

- We are working with so-called Multiboards.
- See video on PEG, pictures and prices available

## Where is PID or SPD (lightning strike protection) located?

There are surge protection devices located in the field DC isolator junction boxes and also at the inverter

## Where do you produce PEG?

In Germany and in our subsidiary in India



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