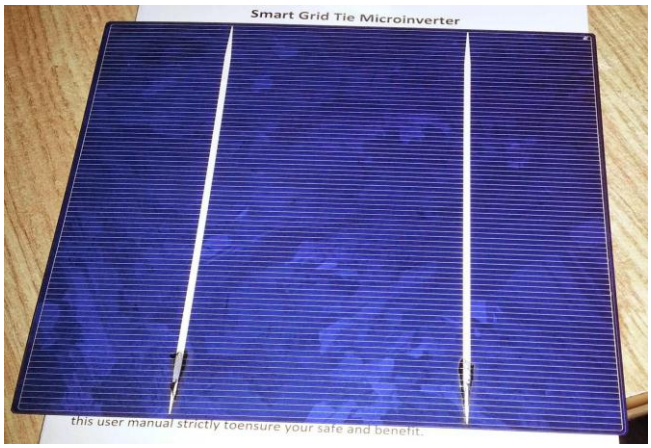
BUILDING A SOLAR PANEL USING POLYCARBONATE BASE INSTEAD OF GLASS



Cell acquired on Ebay ; 3.5W and 14.1% efficiency 100 ud. € 105 from Solar_rex

Lately he has given me to go against the government moves about , and I'll build a couple of experimental solar panels that give me hope 340 Wp. This ideal situation is never going to give, so at least I hope that normally produce about 150W with good sun, that's what I always spend a minimum and thus eliminating the cost of an appliance like a refrigerator; I estimate a saving of about 5 € per month. It's not much, but the cost of all materials as amortizaré in about 6 years, and if all goes well, will produce about 20 years.

Contrary to what you think our government (as usual), **photovoltaic panels HOUSING** (I am against them on land until they are more efficient than trees SETTING obtaining energy and CO2) **only have advantages for that install and**

rest of society; produce more than they consume and generate when it is consumed, stabilizing the system and reducing energy losses. And that that that install "take advantage of the system by eating at other times" is very subjective, and only affect the hours from 17 to 23 hours a day, and that hour the rally can be supplemented by indigenous energy Green generation from solar, very economical and available at those times hubs.

Although I'm going to do because I love the "do it yourself" and has always done me a huge illusion build me one, **usually fabricarte your own panels is not profitable** , because, apart from the time required for all the preparations, they can stay bad and quickly spoil if they are not adequately insulated from moisture; no finished panels that only cost 50% more than it would cost only loose materials.

Using polycarbonate base But as we are, **we will break the deck and risk using insurance, economic and resistant polycarbonate instead of the usual low-iron tempered glass**.

Advantages of using polycarbonate front glass photovoltaic panels :

- Economy; It is up to 4 times cheaper.
- Resistance: It is virtually unbreakable; endures all hail; 200 times more resistant than glass.
- Lightweight: Weighs approx. 3 times less than the glass.
- Security: A traditional glass module released by wind or poor subject represents a great danger to people and materials by weight and features.
- Utility: flexible, easy to work, can be drilled and cut easily.

Disadvantages of PC versus safety glass:

- Dilates 3 times more than the glass (coef. Of 65x10E-6 versus 20x10E-6 glass), so you need to choose a fastening material PC cells to absorb these thermo-mechanical stresses.
- Has less transparency; while the crystal can reach 98%, the PC is 90% (without considering that usually come treaties to reflect UV rays and longer life).
- Whitens time; 20 years transparency is reduced by 5% in those treated against UVA as Lexan that I use.

Less transparent it is not greater problem; to receive less sunlight silicon cells will produce somewhat less daily life but also extend proportionately as they can only

produce a certain amount of energy before going to deteriorate more and more (as mentioned, about 25 years).

By having silicon cells PC and the motion control different thermal expansion coefficients, the choice of a material mooring cells while protecting them and to stretch along with the PC base is critical to ensure the durability of the panel and the cells. **Let's see how we will dilate panels have prepared**.

The expansion coefficient of polycarbonate is about 67 x 10E-6 = 0.00067. To calculate what we will dilate we must use the following formula:

Thermal deformation (*d*) depends on the coefficient of thermal expansion (*a*), element length (L) and the temperature change (DT) and can be calculated as:

$$d = a \; L \; D \; T$$

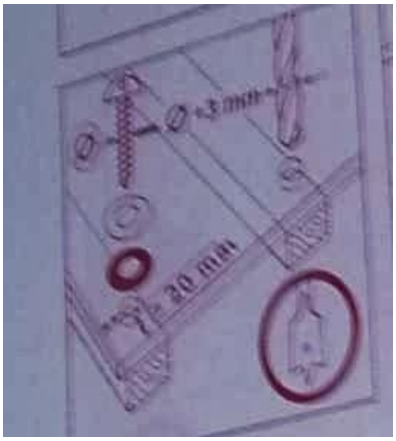
Therefore, the plate that will use the maximum variation that you will have are:

0.000067 * 1500 mm long * dif. temperature (about -15 to 70 ° C;. 60) = **8.5 mm.approx.**

70 is in the worst case, when the summer sun tightening, as the cells become very hot and much of the heat transferred to polycarbonate. Evitarems clamps fixed everything, and if we have to drill to fix, we will have sufficient clearance for expansion; just make holes with a torn 1cm holding screw and washer grandesy rubber without tightening completely, so that the panel is subject but can "float" on the grip.

If we do well and put too many screws **while the plastic shrink and expand, it will eventually break**.

To pierce the solid plate drill we can use wood or iron, ensuring that the material does not get too hot while drilling (can use a little water for cooling).



Indications drilling in plaque

Using neutral silicone sealant as the other hand, considering this, we must analyze the adhesive used to fix the cells, the first thing that came to mind was the epoxy resin and neutral silicone; speaking with a professional bouquet **I opted for**

the neutral silicone resistance to UV light, durability, flexibility, price and especially adherence to PC . If we choose to fix the cells using neutral silicone transparent only from the reverse side, which has an excellent grip on the polycarbonate and allows the passage of light between cells, keep in mind that the cells, dilation effect PC, they will rub therewith to fray a little while emborronándolo over the years; reducing its efficiency, we must also assess put between the cell and polycarbonate, as thin as possible, for the expansion of polycarbonate, to get cooler than the cell, the end will be close to it; and 5 mm. to dilate up to that extent the PC compensate with 3 mm. maximum of each of the cell expansion; 2 mm. difference that silicone can stand perfectly.

	PUR	*Silicone*	*EVA*	*TPU*	*PVB*	*Ionomer*
Moisture influence	bad	average	average	bad	average	good
Processing	average	average	bad	good	good	good
Long-term stability	average	good	average	good	average	good
PC-compatibility	average	good	unknown	good	bad	unknown
Expansion behavior of the combination	good	good	bad	bad	bad	bad

Finally remains to determine whether the silicone chemistry we choose attack the material of the photovoltaic cell. The information I have found is that even can replace the EVA as a sealant most effective and easy to work, such as acetone silicone Neutra, that being neutral, if we let it dry well does not have to give any

problem, but time will tell as silicone used is relatively new. **The transparent neutral silicone has the following advantages** over other materials:

- Excellent adhesion to PC.
- Stable and resistant to UV rays to the weather.
- Wide range of operating temperatures; holds no muss from -50 to 250 ° C.
- If it is colorless, has excellent light transmission.
- Unsurpassed flexibility, up to 400% elongation.
- Repairable and easy to use.
- Economic.

To mount the first cells have to stiffen the polycarbonate , for although the cells have a bit of stretch (very little, are extremely fragile), we must prevent us twice to go to place.

To do this I will prepare in advance for the support, and I will tie him to place the cells then glued with neutral silicone colorless transparent.

Source: http://crecimiento-sostenible.blogspot.in/2015/01/building-solar-panel-using.html