

PHOTO: ALAMY



Rigid panels like this one deliver the most power for your money, but are fragile and must not be stepped on

What solar panel will work best on your boat?



Emrhys Barrell conducted a thorough,

comparative test of 16 solar panels

We carried out our test in early October, roughly halfway between mid-summer and mid-winter. You can expect the figures we measured to improve by 20-30% at the height of summer, and reduce correspondingly in winter. We conducted our test at midday, when the sun is at its highest, and giving the maximum output. Again, these figures will reduce

at either end of the day. To estimate total energy output, it is generally assumed that on average, over the year, you will get four hours' useful sunshine per day.

Maximum output

To get the maximum output, which is the figure you will see quoted in manufacturers' specifications, we angled the panels to face square-on to the sun. In practice, most of us will fit panels horizontally, which will reduce the actual output by an amount that varies depending on the time of year. In summer, with the sun high in the sky, and in latitudes closer to the equator, the output with the panel flat will be 80-90% of the angled figure, but in mid-winter it can be down to 25-30%. On test, the flat output of all the panels



Test in progress: Emrhys monitors a panel's performance while it tops up a marine battery

and volts, into a half-charged 80Ah battery. We connected each panel directly to the battery, with no charge regulator in the circuit, to ensure we were reading the maximum output possible. In practice, all but the smallest panels need a regulator – otherwise, as the battery reaches full charge the voltage produced by the panel will increase well above the battery gassing point of 14.2V. To prove this

was approximately 40-45% of the angled figure.

To achieve maximum output it is worth considering angling the panels towards the sun, but output will fall dramatically if your boat then swings on her mooring, whereas for a horizontal panel it will remain constant. We measured the output of each panel, amps

point, we then connected each panel to a fully charged battery. In most cases the voltage then rose to at least 16-17V.

Most panels will come with a diode fitted across the output terminals, which prevents the battery discharging back through the panels at night. Regulators will do this automatically.

General findings

As expected, the rigid panels delivered the greatest output – per square metre and per pound Sterling – but are more vulnerable to damage, and more complicated to install, requiring some sort of frame or gantry. The semi-flexible panels can be fixed to your deck, even if it is cambered, and can be walked on, but are nearly twice the price.

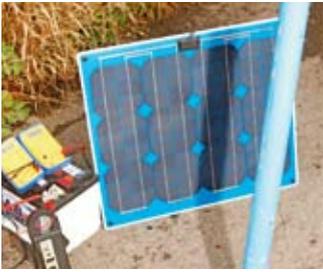
Both lose nearly half their performance if a shadow or rope falls across them.

Fully flexible units are the most versatile in their ease of installation and resistance to damage, but only deliver around half the power per square metre, – again almost double the price, watt for watt. However, they are far less affected by shadows.

All the panels on test can make a useful contribution to either your daily power requirements, if you are away from shore-

power for long periods, or will keep batteries fully charged when you are away from the boat, so helping to preserve the life of these expensive items.

When comparing the results of the different panels we tested, you should bear in mind that because of the often tiny currents we were measuring, the figures we have produced have a margin for error of 5-10%, so you should not look too closely at the last decimal place.



We cast a shadow over each panel and noted the effect on its output



We also measured the effect of a rope laid across each panel

'On average, over the year, you will get four hours' useful sunshine per day'

The effect of shadows

We stood a 5cm-diameter pole between the panel and the sun, to simulate the effect of a shadow falling across it, then laid a loose rope across the surface. The reduction in output varied considerably. The reasons behind this relate to the design and layout of the individual photovoltaic cells. In most rigid and semi-flexible panels, the cells are arranged in series – in a chain, which may snake up and down the panel, but essentially remains continuous. If you cast a shadow across one or more cells, or lay a rope across them, you break the chain. Output falls dramatically, to 50-60% of the original unshaded figure.

Fully flexible panels use a different design. Individual cells are cross-linked, and thus the effect of a shadow falling across one area is much less marked, with the output remaining at around 80-85% of the original figure. However, the maximum output of these panels per square metre is only around 60% of the equivalent area in a chain-linked panel, so the overall effect roughly balances out.

Rigid panels

Usually the cheapest type for a given output, rigid panels have the highest outputs for a given area of cells and are available in sizes up to 300W. They are heavier than other types and more fragile – most have glass faces and will break if you step on them. They must be fitted flat and are housed in an

aluminium frame to aid installation, which usually requires a stern arch or gan, where they can be angled to follow the sun and are least affected by shadows. A good compromise for some owners is to hang one each side, on the guardwires alongside the cockpit, and swing them out when at anchor.

Ring RSP150 & RSP480 £20 & £50

Designed primarily for the automotive market, these will also work for a small, simple boat, just to keep batteries from discharging while unattended. They come with a selection of end fittings for the cables, from crocodile clips to 12V plugs. Output of the 150 was 1.5W (8W/£100), while the 480 gave 4.5W (9W per £100).

CONTACT Ring Automotive
WEB www.ringautomotive.co.uk
TEL 0113 213 2000

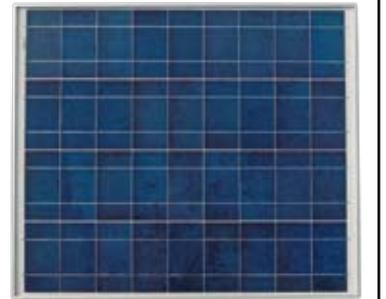
RIGHT:
RSP480
BELOW:
RSP150



Roadpro 60W £270

Roadpro produces three ranges of rigid and semi-flexible panels. The PWR 60 is part of a new range of rigid, aluminium-framed units ranging from 20-130W, available as panels only or complete kits, and offering very good value for money. It has 1.5m of cable, with special push-in end fittings. Output was 54W, at 112W/m², or 20 watts per £100, which represents the second best value on test.

CONTACT Roadpro
WEB www.roadpro.co.uk
TEL 01327 312233



GB Sol 80 £275

The biggest unit on test, this is part of a rigid aluminium-framed range that goes from 60-190W and we think is the only one in our test to be made in Britain. It has 1.5m of cable, with special push-in end fittings. It gave a maximum output of 68W on test, at 110W/m² and 25W per £100 – the best value in its class.

CONTACT GB Sol
WEB www.gb-sol.co.uk
TEL 02920 820 910



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Solara SM200S £302

The Solara SM200S came from Barden UK, which sells a wide range of panels. It is a rigid unit in an aluminium frame, one of a series ranging from 12-130W. Wiring is through a connection block.

CONTACT Barden UK
WEB www.barden-uk.com
TEL 01489 570770

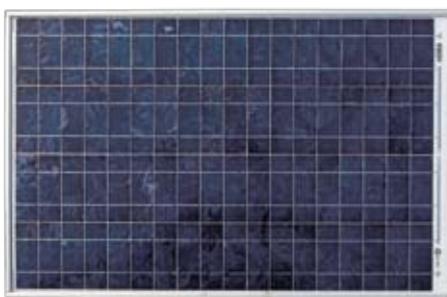
Maximum output on test was 41W, at 106W/m², giving 14W per £100.



BP Solar 350 £352

The BP350 came from Marlec, another major player in the solar panel and wind generator market, with several ranges of panels. It is an aluminium-framed rigid panel, with a connection box for the wiring, one of a range from 40-140W. Output was 46W at 118W/m², giving 13W per £100.

CONTACT Marlec
WEB www.marlec.co.uk
TEL 01536 301588



Semi-flexible panels

PHOTOS: GRAHAM SNOOK



Semi-flexible panels can be mounted on deck and have a non-slip surface

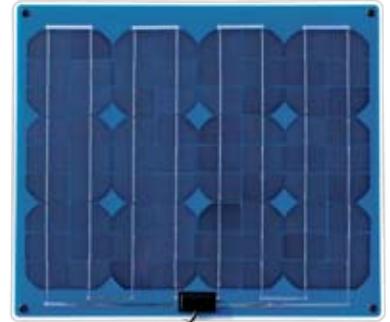
The toughest of the three types, semi-flexible panels can be walked on without damage, as their cells are encapsulated in a resin backing and face. They come in sizes up to about 60W and can be bent slightly in one plane to follow the camber of the deck, usually 3cm bend over a 1m length. They are thinner than rigid panels, their output per square metre is roughly the same and they are similarly affected by shadows, but they are more expensive, due to their construction. They can be mounted anywhere on deck, though you should avoid heavily trodden areas and places where winch handles could be dropped on them.



These panels are designed to bend a little

Spectralite 30 £213

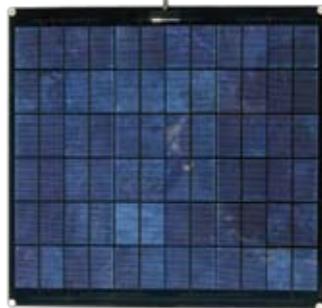
The Spectralite range goes from 5-30W. It has a ribbed, non-slip surface and is fixed with four holes in the corners, which have rubber grommets to protect them from the screws and keep the panel from being hard down to the deck. 3m of cable comes with ring end terminals. Max power was 19W, at 91W/m² (9W per £100).



CONTACT Marlec
WEB www.marlec.co.uk
TEL 01536 301588

InPro Module SM22 £234

A relative newcomer in the marine market, Select Solar has a wide range of panels, with some interesting new designs. The InPro Module – the lightest in its class by a fair margin – is claimed to be suitable for fixing to a curved deck, but we found it had only minimal flexibility and a shiny, potentially slippery surface. maximum power output was 17W, or 106W/m² (7 watts per £100).



CONTACT Select Solar
WEB www.selectsolar.co.uk
TEL 0845 00031 353

PHOTO: EMMHYS BARRELL

GB Sol Flexi 35 £350

The Flexi 35 is part of a semi-flexible range that goes from 18-70W. It's a resin-backed panel with four corner mounting holes, and can bend by 2cm over its length. This unit is supplied with 1.5m of cable and plain wire ends. The maximum power achieved on test was 27W, at 113W/m², which works out at 8W per £100.



CONTACT GB Sol
WEB www.gb-sol.co.uk
TEL 02920 820 910

Sunware 5066 £680

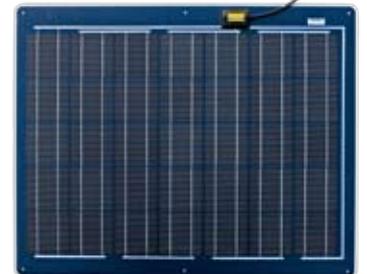
This panel has 39 cells rather than the normal 36, which is claimed to make it more efficient, particularly in overcast weather. It also runs cooler, so can be bonded directly to the deck with no need for ventilation underneath – important in hot climates. The stainless steel backing layer is claimed to be more corrosion-resistant than resin. It comes with 3m of three-core cable. Max output was 45W, at 107W/m² (7W per £100).



CONTACT Marlec
WEB www.marlec.co.uk
TEL 01536 301588

Solara SM225M £713

These units are designed specifically for marine use, with a walkable, non-slip, prismatic-effect surface that is claimed to reflect light onto the cells from all angles, though we found no significant evidence of this. It comes with 1.2m of three-core cable. Peak output was 45W at 120W/m² – the most efficient on test – but the high price gives just 6W per £100.



CONTACT Barden UK
WEB www.barden-uk.com
TEL 01489 570770



Fully flexible Panels



Fully flexible panels are highly versatile: lash them to dodgers, booms, biminis...

Available in sizes up to 32W, flexible panels can be tied to the boom cover, sprayhood, guardrails, shrouds, mast or deck, and moved around to take advantage of shade-free areas. They need to be attached firmly at a number of points when sailing or they will flap,

which can be tedious. Their output per square metre is only 50% of rigid or semi-flexible panels, but they are much less affected by shadows or ropes laying across them. However, they are more expensive to buy for an equivalent output.



The most flexible panels can be rolled up for easy stowage

PHOTOS: GRAHAM SNOOK

Solar Trader 32W panel £310-£333 (sold under various brand names)

This panel appeared three times in our test, under different names (Flexi Solar 32, Select 32 and Spectraflex 32) and at different prices, but apparently always made by Solar Trader. It is a stout piece of equipment with a strong, cushioned, flexible backing.

Grommets in the corners allow you to hang it from the guardrails, wrap it round the boom, or hoist it up the mast. It is even claimed to float, though we did not put this to the test.

The performance of our three clones was virtually identical. Maximum power achieved on test was 25W, at 57W/m², giving a value



rating of 8 watts per £100. The amorphous silicon cells are cross-linked, so they still deliver a reasonable amount of power in shaded or cloudy conditions, even if they are partially covered. On test, shaded output was 85% of peak output.

Flexi Solar 32 £310

CONTACT Barden UK
WEB www.barden-uk.com
TEL 01489 570770

Select 32 £325

CONTACT Select Solar
WEB www.selectsolar.co.uk
TEL 0845 00031 353

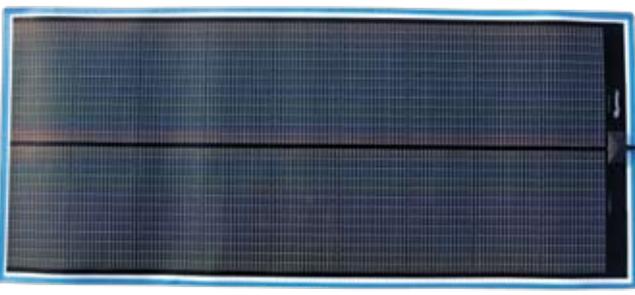
Spectraflex 32 £333

CONTACT Marlec
WEB www.marlec.co.uk
TEL 01536 301588

Select Powerfilm £650

This is an extremely light and flexible panel, which you can roll into a cylinder. It can either be hung in place or glued to the coachroof. Maximum power on test was 40W, at 48W/m². The price is high – no doubt due to its hi-tech construction – giving a value rating of 6W per £100, but the price is for a kit that includes a regulator.

CONTACT Select Solar
WEB www.selectsolar.co.uk
TEL 0845 00031 353



Enecom 72 £850

Also very light, thin and flexible. Output was 56W, at 98W/m² – twice as efficient as the other fully flexible panels and similar to rigid and semi-flexible units. Shaded output was only 65%, again similar to rigid and semi-flexibles. Thus you get the output of a rigid panel and the versatility of a flexible unit, but at a premium price (7W per £100).

CONTACT Select Solar
WEB www.selectsolar.co.uk
TEL 0845 00031 353



The results

Every piece of kit *Yachting Monthly* tests is thoroughly examined against three key criteria

Efficiency

To compare panels of different sizes, we have calculated their efficiency in watts per square metre (W/m²)

Ease of fitting

Scores reflect the need to fit an arch or gantry for mounting all but the smallest rigid panels

Value for money

The power each panel generates for every £100 of its purchase price (W/£100), excluding the cost of fitting a gantry

* *Yachting Monthly* recommended product – see conclusion below

	Each of our three criteria are marked out of 10			Maximum possible score
RIGID				
Ring RSP 150	10	4	3	
Ring RSP 480	10	4	4	
Roadpro 60W	6	9	8	
GB Sol 80*	6	9	10	
Solara SM200S	6	9	5.5	
BP Solar 350	6	10	5	
SEMI-FLEXIBLE				
Spectralite 30	8	7.5	4	
In Pro Module SM22	8	9	2	
GB Sol Flexi 35	8	9	3	
Sunware 5066	8	9	3	
Solara SM225M	8	10	2.5	
FULLY-FLEXIBLE				
Flexi Solar 32	10	5	3	
Select 32W	10	5	3	
Spectraflex 32	10	5	3	
Select Power Film	10	4	2.5	
Enecom 72*	10	8	3	

Test findings in detail

MODEL	Overall size (mm)	Area of cells (m ²)	No of cells	Claimed output (W)	Max test output (W)	Watts per m ²	Shaded output (% of Max)	Weight (kg)	Price (inc VAT)	Watts per £100
RIGID										
Ring RSP 150	330x120x12	0.03	Multi	2	1.5	50	80%	0.5	£20	8
Ring RSP 480	400x340x12	0.10	Multi	5	4.5	50	80%	1.0	£50	9
Roadpro 60W	770x660x35	0.48	36	60	54	112	50%	6.5	£270	20
GB Sol 80	1200x540x35	0.60	36	80	68	110	65%	7.5	£275	25
Solara SM200S	1000x460x35	0.40	35	55	41	106	60%	5.5	£302	14
BP Solar 350	840x660x50	0.39	36	50	46	118	50%	6.0	£352	13
SEMI-FLEXIBLE										
Spectralite 30	560x480x4	0.21	12	29	19	91	60%	2.0	£213	9
In Pro Module SM22	450x430x6	0.16	Multi	20	17	106	60%	1.4	£326	5
GB Sol Flexi 35	800x400x5	0.24	36	35	27	113	55%	2.0	£350	8
Sunware 5066	890x600x6	0.42	39	69	45	107	55%	5.8	£680	7
Solara SM225M	800x650x5	0.37	35	68	45	120	55%	3.0	£713	6
FULLY-FLEXIBLE										
Flexi Solar 32	1420x420x10	0.44	11	32	25	56	85%	2.5	£310	8
Select 32W	1400x420x10	0.44	11	32	25	57	85%	2.5	£325	8
Spectraflex 32	1400x430x10	0.44	11	32	24	54	85%	2.5	£333	7
Select Power Film	1550x670x4	0.86	Multi	42	40	48	85%	1.8	£650	6
En E Com	1230x53x3	0.58	36	72	56	98	65%	1.5	£825	7

Conclusion

For maximum output and value for money the fixed panels are the best, but their mounting difficulties must be considered.

Semi-flexibles are robust and easy to fit. The trade-off is higher cost and lower output.

For the ultimate versatility, fully flexible panels come out on top: they're easy to install, can be hung anywhere and pointed at the sun, then rolled up when not in use. However, they can be just as quickly detached by a thief, so are probably only useable when you are on board or nearby.

Of the individual units, the rigid GB Sol 80 offered the best value in its class and the Roadpro also performed well. The results for

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BEST BUY



£275 GB Sol 80

The best-value rigid panel

YACHTING
MONTHLY
PREMIUM PRODUCT



£850 Enecom 72

High output, highly versatile, high price

semi-flexible panels were too close for us to nominate a clear winner. All the 32W fully flexible units performed equally. The Enecom topped them in output, at a much higher price, but this may come down with time. ▲

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