Input paper: [[1]](#footnote-1) ENG14-3.1.2.5

Input paper for the following Committee(s): check as appropriate Purpose of paper:

**□** ARM  ENG **□** PAP  Input

**□** ENAV **□** VTS **□** Information

Agenda item [[2]](#footnote-2) 3.1

Technical Domain / Task Number 2 …Technical Knowledge and Sustainability / Task 3.1.2.3…………

Author(s) / Submitter(s) …Peter Dobson…………

Procurement of solar modules

# Summary

This paper provides input to the draft guideline of what constitutes a marine solar panel, dealing with the area associated with the procurement.

## Purpose of the document

The paper considers the aspects of procurement of marine solar module as input to the guideline.

## Related documents

Following the work progressed during ENG 13 on the working paper ENG 13-3.1.2.3 WP – What constitutes a good marine solar panel, the following are proposed sections for consideration by the task group during intersessional work.

# Procurement

The process adopted for procurement will be different for each organisations, but this section provides information that should not be process dependant and yet beneficial to obtaining a high quality marine solar module.

## How to specify

As with all items purchased, it is the communication and translation of the requirements that will determine the satisfaction of the product received. This is usually conveyed in some form of specification, ideally capturing measurable desires, but sometimes these are dimensionless, such as “good build quality”. A sample specification is provided in Annex 1 for guidance on some of the requirements that can be specified.

Even if selecting solar modules from a catalogue, it can be useful to capture a specification beforehand to aid in comparison.

## Quantities

When purchasing solar modules, quantity significantly influences the likelihood of achieving your specification. If the quantities are small then the only choices may be to select from a catalogue. If the Wattage required is high, then these modules may well be of the high volume industrial units often used on solar farms. These can be high quality modules, as a result of the mass production processes employed, but may lack some features for a marine environment.

Low volume products may be available, but achieving a high quality may come at a premium cost and could be more difficult to achieve due to the batch nature of the assembly process. It will however likely have all the features specified for a marine environment.

## Delivery

It has been highlighted earlier that micro cracking of solar cells often occurs during handling and transportation. It is therefore important so ensuring effective packaging is achieved to minimise vibration and shock loading. In addition, the packaging and handling also need to avoid physical damage of a more catastrophic nature.

Add photo from Peter S of damage new modules.

# Product Assessment

The initial phase of a product assessment happen during the review of the products specifications against the requirements to see how closely these are achieved and what differences can be tolerated. After this, any assessment involves availability of physical products, either on loan, or after purchase. This can allow for assessment of quality and suitability for the environment, along with confirming things such as physical fit, mounting arrangement and connectivity.

As for longer term performance such as, the ability to resist water ingress and provide the guaranteed output, these are almost impossible to assess, other than through a long term tests. However, such test may well prove pointless as the technology may well have moved on by the time the trials are complete. What these tests do provide is confidence in the supplier’s product generally.

# Recycling and repurposing

Solar modules, at the end of their life, are considered easy to recycle. The frame, whether aluminium or stainless steel can easily be separated. The glass can be broken and collected. The challenge is then around the laminate. This requires heat to burn off the small amount of plastic, leaving the silicon wafers that can be etched away and then smelted into an ingot for reuse. This process does use significant energy and specialist equipment and is driven by the economics of material costs.

An alternative is to this is repurposing. Although a solar module may have reduced in power output, such that it considered unsuitable to provide sufficient energy for AtoN, the module will continue to produce power. This allows the possibility of using old modules for other non-critical purposes or resale for private use. An example of this is ??? Although this is become less appealing as the cost of new modules is so low.

Need a photo.

1. Sample specification

Below is a list of key parameters that could be included as part of a solar module specification.

| **Parameter** | **Sample value** | **Comments** |
| --- | --- | --- |
| 1. Electrical Characteristics   Nominal power (@ STC)  Nominal voltage  Open circuit voltage  Short circuit current  Module efficiency  Temperature coefficients  Voc  Isc  Pmax  Leakage current | 100W  12V  <20V  >5A  >15%  -0.17 ±0.01 V/°C  3 ± 1 mA/°C  -0.4 ±0.1%/°C  <0.1µA |  |
| 1. Electrical facilities   By-pass diodes  Blocking diodes  Connectivity  Cable  Junction box size  Junction box attachment | Fitted  Fitted  Latching MC4 IP65/ IP2x (mated/ unmated) 2 ±0.1m cable  100mm x 100mm x 50mm  Adhered to backing panel |  |
| 1. Mechanical Characteristics   Dimensions  Mounting arrangement  Weight  Material | 1600mm x 1000mm x 50mm  Frameless  < 12kg  ?? |  |
| 1. Environmental characteristics   IP rating  Max & min operating temperature  Humidity  Shock & vibration  Corrosion class | IP65  70°C to -10°C  100% condensing  ??  ?? |  |
| 1. Environmental Loadings   Maximum wind loading  Maximum snow loading  Maximum structural deflection | ???  ???  <50mm |  |
| 1. Warrantees   Service life  Material warrantee  Warranted output power | 20 year  10 years  90% of nominal after 10 years  80% of nominal after 20 years |  |
| 1. Standards   ??? |  |  |
| 1. Tests / documentation   Typical IV performance curve | Provided |  |
| 1. Other   Module Identification | Unique serial no. |  |

# Action requested of the Committee

The Committee is requested to: (Body text)

1. Forward the input paper to working group 2 for review and consideration as input to the draft guideline on “what constitutes a good marine solar module”.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Leave open if uncertain [↑](#footnote-ref-2)