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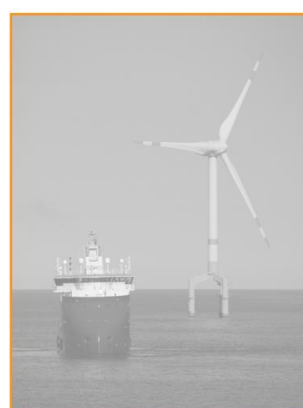
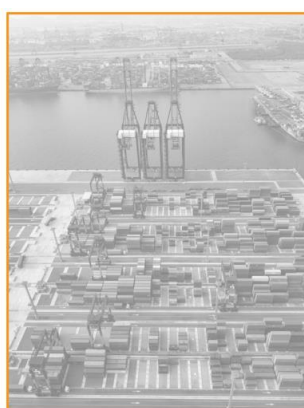
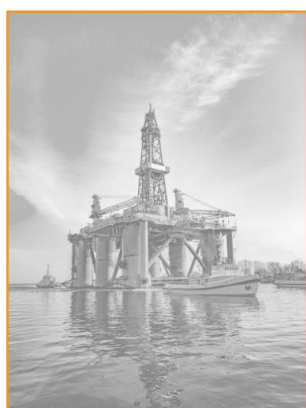
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MENTER MON

MORLAIS DEMONSTRATION ZONE AIDS TO NAVIGATION PLAN



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Versioning

Date	Release	Prepared	Authorised	Notes
01/09/2023	Draft A	PB	AC	Draft A for client comment
07/11/2023	Draft B	PB	AC	Draft B after Trinity House comment
04/12/2023	Draft C	PB	AC	Draft C after additional Trinity House comment
31/01/2024	Draft D	RH	AC	Draft D, removal of reflective strips and amended as per Trintiy House comments
23/02/2024	Draft E	RH	AC	Draft E, updated device specific information and inclusion of the maintenance plan for AtNs
29/04/2024	Issue 01	RH	AC	Final Issue for the Phase One installation

1 INTRODUCTION

Following the successful consenting of the Morlais tidal Demonstration Zone (MDZ) in December 2021 (see **Figure 1** for site layout), this Aids to Navigation Plan (AtNP) has been prepared by Marine and Risk Consultants Limited (Marico Marine) in response to marine licence (ORML 1938) conditions with regards to the 4 tidal devices that make up Phase 1 of the project, scheduled for deployment in 2026. It should be noted that this document is intended as a “living document”, the contents, of which, are up to date at the time of release.

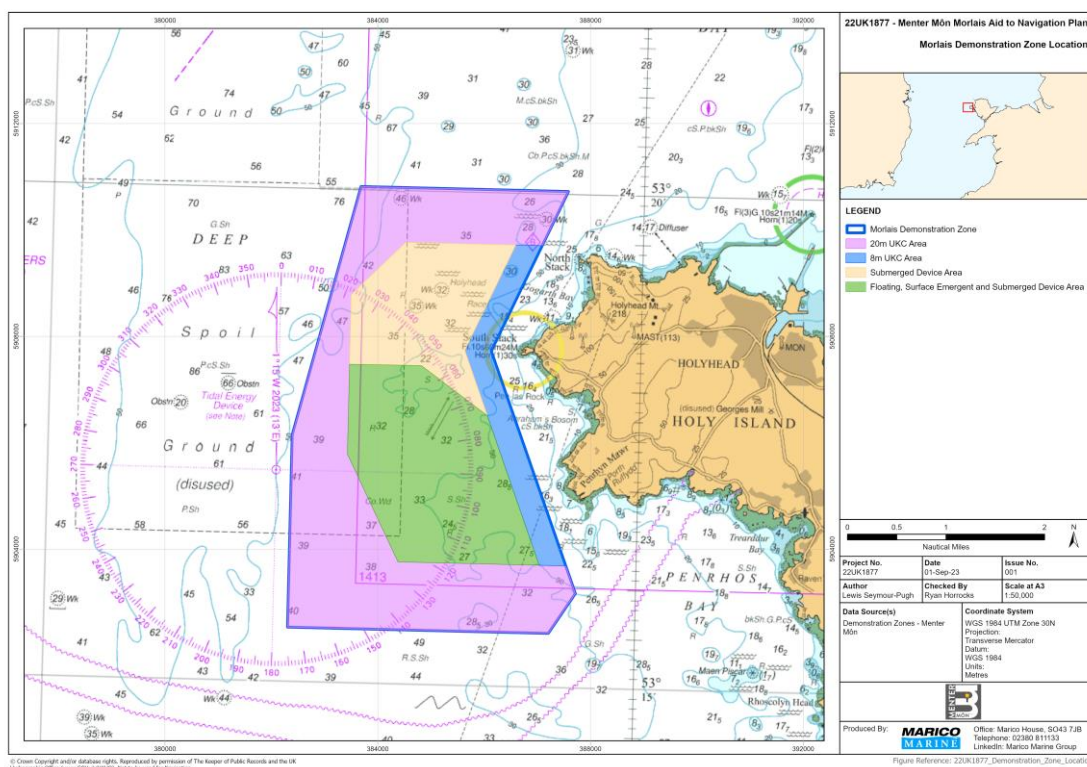


Figure 1: Location and zoning of the Morlais Demonstration Zone.

2 GUIDANCE AND RECOMMENDATIONS

The AtNP has considered the documents outlined within **Table 1** as the basis for its recommendations and findings.

Table 1: Guidance Document Table

Policy / legislation
MGN 654 Safety of Navigation: Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response.
G1162 - International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA AISM) - The Marking of Man-Made Offshore Structures.
IALA Guideline No. 1098 on the Application of AIS - AtoN on Buoys.
Menter Mon Morlais Demonstration Zone Navigation Risk Assessment Addendum.
Menter Mon Environmental Statement – Chapter 4 paragraph 4.3.6 – Light Pollution.
Menter Mon SLVIA Post Application Consultation - MDZ_A28.19-MMC146-MOR-SLR-DOC-0001.

2.1 NAVIGATION RISK ASSESSMENT

The 2020 Navigation Risk Assessment (NRA) identified various collision hazards, some of which scored marginally above the ALARP range. The NRA made a number of recommendations to mitigate these risks which included recommendations to amend the zones of the project, to control navigation of vessels and to ensure the Aids to Navigation associated with the project were compliant and approved by the General Lighthouse Authority, Trinity House. These items were discussed and developed in great detail at the public inquiry, the recommendations and concerns of which have assisted in producing this Aids to Navigation Plan.

3 TIDAL SPECIFIC AIDS TO NAVIGATION

3.1 PHASE ONE – MAGALLANES INSTALLATION, 2026

Having understood the IALA guidance, consulted with Trinity House and incorporated the direction given at Public Inquiry, the Aids to Navigation plan for phase 1 of the Morlais MDZ is as follows:

The availability for all daymarks and markings, top marks, lights, AIS transponders, their positioning systems and all other Aids to Navigation described below has been set by Trinity House at Category 2; available for 99% of the time.

1. The ends of each device will be painted yellow above the waterline. The extent of the yellow band should be at least 5m wide and high.
2. In addition, there will be a yellow vertical band either side midships, painted behind the identification number of each device.
3. Each device to carry a yellow "X" top mark. This to be at least 1.2m high and wide and to be at least 1 m clear of any other structure on the device, "where it can best be seen."
4. Each device to have a yellow light flashing every 5 seconds – with a sectorised visible range of 5nm from 310°T through West to 190°T and 2nm from 190°T through East to 310°T. The light to be sited at least of 5m above the waterline and not obscured by any part of the device structure. The yellow flashing light to be synchronised with the lights on the other 3 devices such that they flash together.
5. Hazard Warning Signals (fog signals) will be installed on the northern and southwestern most devices sounding a 2 second horn every 30s.
6. The northernmost and southwestern most device to have a Type 3 AIS transponder, enabling it, when interrogated, as a minimum to transmit a Message 21 to containing the following information:
 - MMSI, according to ITU category
 - The type of AtoN
 - The name of the AtoN
 - A valid 2D position of the AtoN within the accuracy indicated by the position accuracy indicator
 - A position accuracy indicator
 - Type of position fixing device
 - Off position indicator
 - Time stamp

- Dimensions of the AtoN and reference positions
 - Virtual AtoN flag
 - RAIM flag
7. In addition to that provided by the AIS transponders on the northern and south westernmost devices, all devices to have their own GPS and position transmission capability to warn of “off position.”
 8. The NRA has stipulated that each device and its AtoNs will be monitored 24 hours a day and in real time by the project management. The position of each device will be reported in real time by the GPS equipment mentioned in paragraph 8 and the performance / appearance of the AtoNs remotely monitored 24 hours a day by comprehensive CCTV coverage on each device. In the construction phase a guard boat will also be on station 24 hours a day.
 9. In the event that an AtoN fails, the project management team will report this using the Trinity House Local AtoN Reporting System (LARS). Work to rectify the fault will be actioned in less than 24 hours, mobilising standby support from Holyhead so as to meet the 99% availability criteria. A Notice to Mariners and Broadcasts should be issued when necessary to do so.
 10. A recovery and maintenance plan for the devices has been developed by Magallanes and has been included in **Annex A**.

3.1.1 Device Specific Information

The devices are manufactured and built by the company, Magallanes. The specification of the devices and details on their anchorage are shown in **Table 2** and **Table 3**. There are 4 tidal devices that due to be installed during phase one, the coordinates of which are shown in **Table 4** and illustrated in **Figure 2**. The deployment of these devices is scheduled to be between 2025-2026.

Table 2: Device Specification.

Device	
Length	53.6m
Breadth	7m
Draught	24m with blades in operation
Deck height above sea	1.97m
Number of devices	4

Rotor diameter	21m
----------------	-----

Table 3: Anchorage Specification.

Anchorage	
Type	50T x 3 gravitational steel chain mooring clumps per line
Number of lines per device	4 x 150m lines
Total Footprint (4 devices)	430m ²

Table 4: Coordinates of Device Deployment.

Deployment locations (WGS 84)										
Device	Latitude		Longitude		Latitude			Longitude		
	D.Degrees		D.Degrees		deg	mins		deg	mins	
Device 1	53.29435	N	4.71067	W	53	17.66	N	4	42.64	W
Device 2	52.29209	N	4.70909	W	52	17.53	N	4	42.55	W
Device 3	53.28941	N	4.70952	W	53	17.36	N	4	42.57	W
Device 4	53.28959	N	4.70747	W	53	17.38	N	4	42.45	W

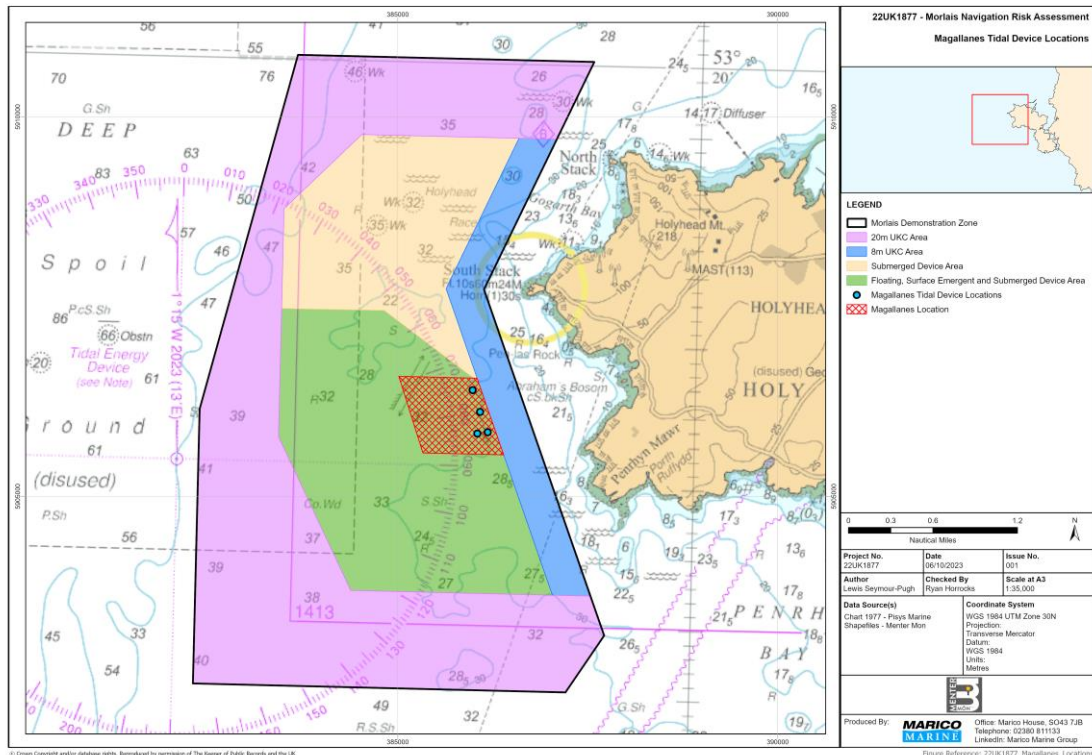


Figure 2: Magallanes Device Locations.

Annex A Maintenance Plan

1 INTRODUCTION

This Navigation Lights Maintenance Plan outlines the procedures and schedules to ensure the proper functioning and compliance of navigation lights on the ATIR 2.0. Regular maintenance is essential for maritime safety, aiding in the vessel's visibility during various navigational conditions.

Given that ATIR 2.0 is an unattended offshore platform, the navigation lights maintenance plan will differ significantly from conventional ship maintenance practices.

2 RESPONSIBILITIES

2.1 REMOTE OPERATORS:

ATIR 2.0 is continuously monitored remotely through its SCADA system. One of the responsibilities of the remote operator is to regularly diagnose the operation of navigation lights using the CCTV.

If an issue is detected with the navigation lights, it will be reported and logged into the maintenance task list.

2.2 MAINTENANCE CREW:

The maintenance crew's responsibilities will include performing periodic preventive maintenance according to the lights manufacturer's guidelines and corrective maintenance and conduct necessary repairs or replacements when a malfunction is detected.

In the event of fail with the navigation lights, it will be given the highest priority within the maintenance task list.

Given the critical importance of navigation lights for the Navigation Risk Assessment (NRA), the maintenance crew's responsibilities will also include visually inspecting the navigation lights whenever they go on board for preventive or corrective maintenance unrelated to the navigation's lights. This is, of course, contingent upon safe sea and weather conditions.

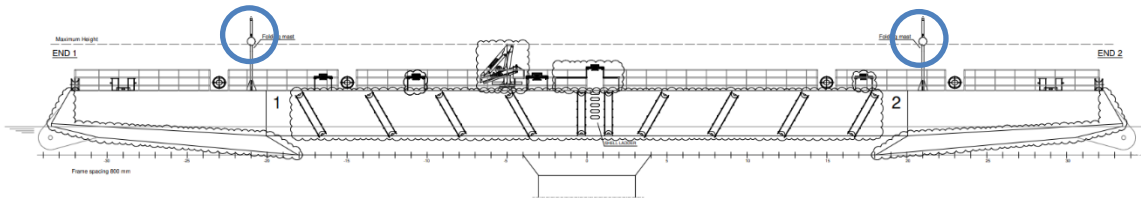
3 NAVIGATION LIGHTS OVERVIEW

3.1 MASTHEAD LIGHTS:

Description: Given the nature of ATIR 2.0, which is anchored and stationary, it is equipped with two navigation lights mounted on separate masts. These lights are all-round yellow lights, flashing once every five seconds (Fl. Y. 5s) with a nominal range of 2/5 nautical miles. They are positioned at a minimum height of 3 meters

above any other obstruction. These two lights are synchronized and located on the outer lengthwise extremities of the device.

Masthead lights are located will be located at frame 21 and -21 on ATIR 2.0. They provide visibility to other vessels.



For this purpose, a preselected model of the Solar Marine Lantern SLC310 from the Manufacturer's technical service brand has been chosen.

The SL-C310 is a durable and self-contained series of Solar LED marine lanterns designed for a visible range of 3-5NM+. This range offers three chassis sizes, and an optional satellite connectivity feature is available.

3.1.1 Key Features:

- Intensity Range of 3-5NM+
- Enhanced Optics
- GPS Synchronization
- High-performance, premium-grade solar modules with active MPPT
- Satellite Communications Enabling Two-Way Monitoring

3.1.2 Intensity Range:

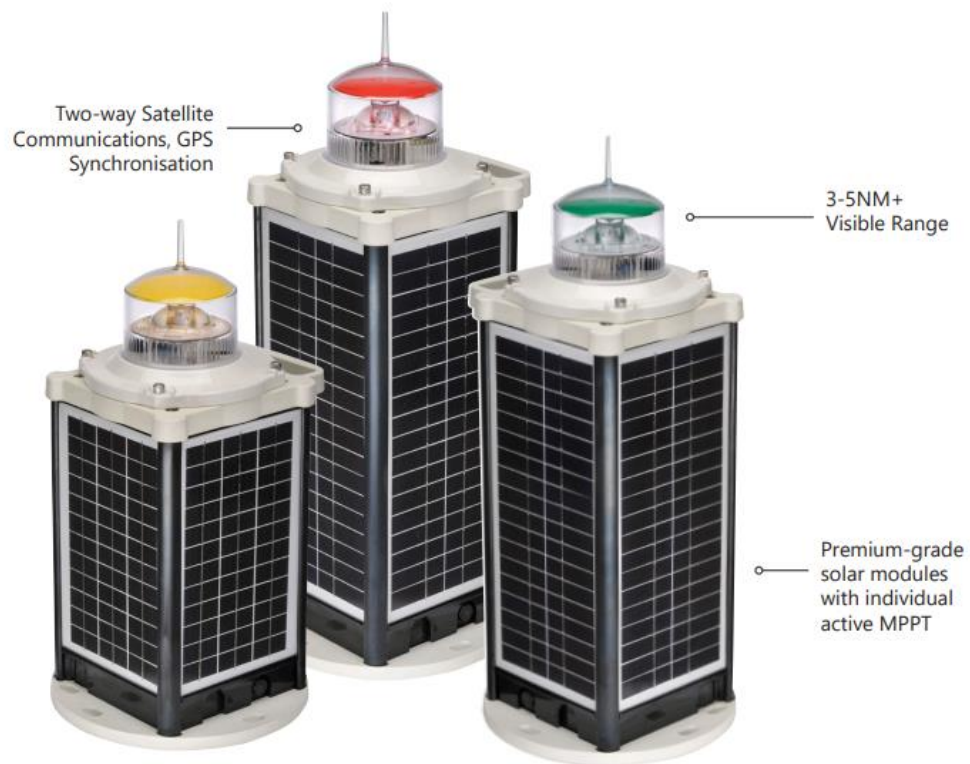
The SL-C310 lantern range utilizes cutting-edge LED technology, providing a visible range of 3-5NM+.

3.1.3 Enhanced Optics:

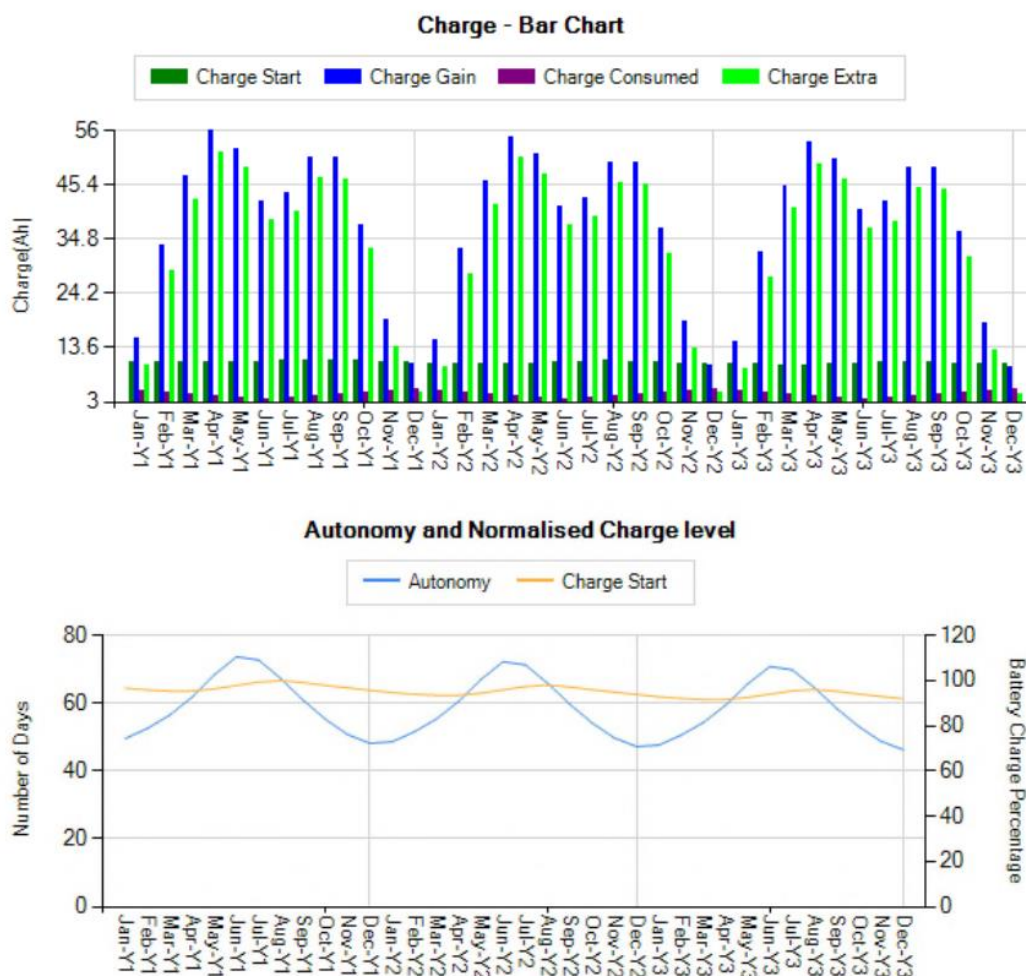
The design of optics and lenses ensures that vessel operators can clearly observe the light from above when passing the Aid to Navigation (AtoN).

3.1.4 Solar Efficiency:

Engineered with next-generation solar technology, including individual active MPPT (maximum power point tracking), the lantern maximizes power extraction from solar panels, enhancing overall performance and efficiency.



The autonomous power supply system for navigation lights has been engineered to ensure ample battery capacity, even on the shortest winter days, considering high cloud cover. This resilience is evident in the following graph:



Furthermore, given the critical nature of the navigation lights, they will be connected to an auxiliary power source linked to the general UPS (Uninterruptible Power Supply) of the ATIR 2.0 device.

4 ROUTINE INSPECTIONS

4.1 REMOTE DAILY CHECKS:

A weekly check will be conducted by the remote operator through the CCTV system of the ATIR 2.0. At the conclusion of night supervision shift, the remote operator will verify through the deck cameras that the all-round lights are illuminated. In case daylight has already arrived at that time, recordings from the night stored on the server will be reviewed to ensure that the lights have operated until dawn.

There are two redundant deck cameras in place to verify the status of the lights. If one or more cameras were to be damaged, for example, after severe weather conditions, and the lights check cannot be done, the remote operator detecting this issue will add the repair to the maintenance task list with medium priority.

4.2 RUTINARY ONBOARD CHECKS:

As mentioned earlier, each time the maintenance crew goes on board, they will conduct a visual inspection of the all-round lights. This inspection will verify:

- There are no visible impacts or damages in the lenses, solar panels, or other components of the housing.
- There is no accumulated debris or dirt (such as bird droppings or salt residue) obstructing the lenses or solar panels.
- There are no evident signs of corrosion emanating from the lights.
- No condensation is observed inside the lenses.

5 PREVENTIVE MAINTENANCE

Designed to be almost maintenance-free, the SL-C310 requires minimal attention, though the following maintenance and servicing information is provided to help ensure the life of the lights.

5.1 CLEANING SOLAR PANELS

Occasional (at least one year) cleaning of the solar panels may be required. Using a cloth and warm soapy water, wipe off any foreign matter before rinsing the panels with fresh water.

5.2 BATTERY CHECK

Inspection of batteries should be performed every three years (minimum) to ensure that the charger, battery, and ancillary electronics are functioning correctly. Using a voltage meter, check that the battery voltage is at least 12 volts under 100mA load and ensure all terminals are clear of foreign matter.

5.3 O-RING CHECK

Inspect the condition of the O-ring for damage, wear or if it is brittle. Replace if necessary. The O-ring should be a rubber texture to ensure a complete and even seal.

6 REPAIRS AND REPLACEMENTS

6.1 REPLACING THE BATTERY

The SL-C310 have an internal battery compartment, which provides the user with the ability to change the battery after years of operation. Contact Manufacturer's technical service should a replacement battery required.

1. Remove the four socket-head screws on the top lens assembly and separate the SL-C310 lens assembly from the body/base section.
2. Remove 2 x M4 cap screws & washers from the top of the chassis.
3. Disconnect the light head and battery via the 4-Pin connector.
4. Lift the upper battery bracket out of the SL-C310.
5. Remove the old battery from the chassis.
6. Discard old battery in a safe manner.
7. Reconnect the new battery.
8. Place battery back inside lantern body and position the upper battery bracket in the top of the chassis.
9. Secure using 2 x M4 cap screws & washers.
10. Feed all wiring back inside lantern body, and make sure the O-ring is properly placed at the top of the lantern body. Reconnect the 4-Pin connector.
11. Place the top lens assembly back onto the lantern body and replace 4 socket head screws. Half tighten all 4 socket head screws, and then fully tighten each socket head screw to ensure an even seal. To achieve a satisfactory seal, it is recommended that a torque of 3Nm is applied to the bolts used for holding down the Light Head to the Solar Base and that only the supplied bolts are used. Applying a higher Torque setting is not recommended and may void warranty. If in doubt, please contact your local Manufacturer's technical service representative.
12. To test, place dark cover (towel or jacket) on top of the lantern to activate sensor, light will come on. Care must be taken to observe the polarity of each wire before they are connected. To ensure waterproofing of the unit, make sure that there is an even seal.

6.2 LONG TERM BATTERY STORAGE

If the SL-C310 is to be placed in storage for an extended period please follow the below information. The sealed lead acid batteries inside the lantern must always be stored in a fully charged state. Always make sure to disconnect the light head from the solar unit. All batteries will discharge over time and the rate of discharge is dependent on temperature. If the light is being stored in temperatures greater than 40°C the battery will discharge faster. Please check battery regularly and recharge if necessary.

Re-connect the light head and battery and place unit in the sun for 2-4 days.

6.3 SOLAR PANEL REPLACEMENT

The SL-C310 range is built around an internal aluminium chassis. The solar panels can be user-replaced in the unlikely event that one is broken or damaged during the product's life.

Follow the steps below or contact support@sealite.com for more details.

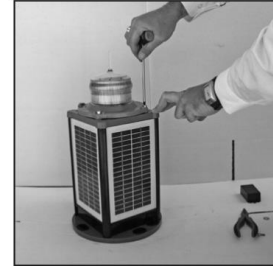
1. Remove 4 x M6 x 20 socket head cap screws and 4 x M6 nylon washers and disconnect the light head from the chassis
2. Remove the 2 x M4 x 20 socket head cap screws, 2 x M4 spring washers and 2 x M4 penny washers. Remove the upper battery bracket containing regulator.
3. Disconnect the battery
4. Remove 4 x M6 x 35 socket head cap screws, to remove the top casting from the chassis.

Note: Be careful not to damage the o-rings on each of these screws. If replacements are required, please use standard 6x1.0mm o-ring.

5. Slide the rubber corner out of the chassis, it may be necessary to lubricate the edges of the solar panels with grease or oil based lubricant if this is difficult to remove.
6. Unscrew the affected panel wires from the regulator and remove the solar panel from the chassis.
7. Clean any silicon off the chassis from the solar panel junction box hole and add a new seal to ensure the solar panel is watertight when assembled.
8. Repeat the process in the reverse order to replace a new panel.

Note: Make sure the O-rings on the top casting and 4 x M6 x 35 socket head cap screws are coated in silicon grease before re-assembling.

To achieve a satisfactory seal, it is recommended that a torque of 3Nm is applied to the bolts used for holding down the Light Head to the Solar Base and that only the supplied bolts are used. Applying a higher Torque setting is not recommended and may void warranty. If in doubt, please contact your local Manufacturer's technical service representative.


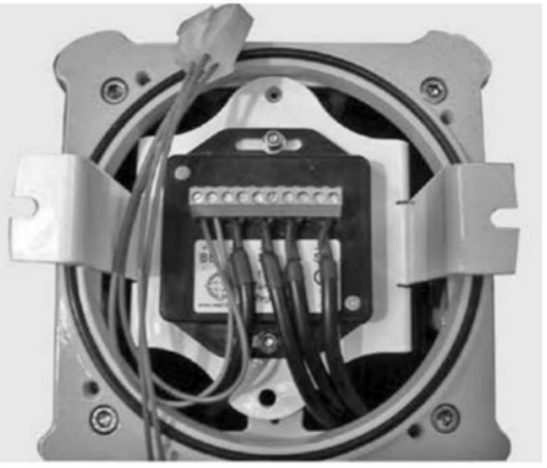


The replacement of a solar panel should only be performed by a confident technician. To test for any leaks remove the gore vent and pressurise the assembled Light to 1.5psi.

6.4 HOW TO CHANGE THE REGULATOR

1. Remove the 4 x M6 x 20 socket head cap screws and 4 x M6 nylon washers, then disconnect the light head from the chassis.
2. Remove the 2 x M4 x 20 socket head cap screws, 2 x M4 spring washers and 2 x M4 penny washers then remove the upper battery bracket containing the regulator.
3. Disconnect the battery.
4. Take note of the wire colours and location in the regulator.
5. Disconnect the wires from the regulator.
6. Remove the 2 x M4 CSK screws, 2 x M4 nylock nuts and 2 x M4 penny washers that retain the regulator to the top battery bracket and remove the regulator.
7. Fit the new regulator using the 2 x M4 CSK screws, 2 x M4 penny washers and 2 x M4 nylock nuts.
8. Connect the solar positive wires to the S points on the regulator.
9. Connect the solar negative wires to the S points on the regulator.
10. Connect the battery positive wires to the B point on the regulator.
11. Connect the battery negative wire to the B point on the regulator.
12. Reconnect the battery.
13. Refit the battery top bracket into the solar unit using the 2 x M4 x 20 socket head cap screws.
14. Ensure the top O-ring is sitting correctly into the top casting. Refit the light head and tighten the M6 x 20 socket head cap screws with the 4 x M6 nylon washers evenly.

DO NOT OVERTIGHTEN.

	
<p>Use the label to ensure correct location of wires during assembly</p>	<p>SL 10 AMP Regulator shown when correctly fitted</p>

7 DOCUMENTATION

The maintenance documentation for the ATIR device will include the maintenance manual for the lights.

At the end of the service, the maintenance crew will input the necessary data into the service sheet or through the web interface of the CMMS (Computerized Maintenance Management System) software.

8 TRAINING

8.1 TECHNICAL TRAINING:

Ensure maintenance personnel receive adequate training.

Keep them informed about updated technologies and standards.

9 REVIEW AND UPDATES

9.1 REGULAR REVIEWS:

Periodically review the effectiveness of the maintenance plan.

Adjust procedures based on feedback and evolving requirements.

9.2 REGULATORY UPDATES:

Stay informed about changes in maritime regulations.

Update the maintenance plan accordingly.

By adhering to this Navigation Lights Maintenance Plan, we aim to enhance the safety and reliability of the vessel's navigation lights, ensuring optimal performance and compliance with maritime standards.



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