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| From: EEP Committee | ANM20/9.1/49  Formerly EEP20/output/8 |
| To: ANM Committee  IALA Secretariat | 19th April 2013 |

Liaison Note

Aids to Navigation Guide (NAVGUIDE) 2014

# Introduction

The ANM Committee has been asked to coordinate a limited review of the IALA NAVGUIDE in time for re-issue at the 2014 IALA Conference. Given the significant amount of updating that occurred with NAVGUIDE 2010 it is IALA’s expectation that only a limited review of the document will be necessary.

The ANM Committee has requested all Committees to note the requirement to update the NAVGUIDE and provide advice on any required changes for input to ANM 20 in April 2013.

# Action requested

The ANM Committee is requested to note the following with regard to the work item on the review of the NAVGUIDE:

* EEP20/output/22 contains an EEP action plan for updating sections of the NAVGUIDE that have been allocated to EEP by ANM. This may be useful in updating the ANM NAVGUIDE action plan.
* Page 139 - Section 7.1 Types. This section contains a reference box as follows. EEP WG3 notes that IALA Guideline 1067-0 does not open correctly from it's link.

**Refer to IALA publications:**

*IALA Guideline 1067-0 on Selection of Power Systems for Aids to Navigation and Associated Equipment.*

*IALA Guideline 1067-1 on the Total Electrical Loads of Aids to Navigation.*

*IALA Guideline 1067-2 on Power Sources.*

*IALA Guideline 1067-3 on Electrical Energy Storage for Aids to Navigation.*

* Page 140 - Section 7.2.1 Solar Power (photovoltaic cell). The 3rd bullet point should be amended as follows:

slight deterioration in power output over its life; and

and the following sentence changed as follows:

When used to power a light, the battery recharging process is separated from the operation of the light source so that the recharge voltage can be optimized without detriment to lights operation.

* Page 140 – Table 24 – Silicon solar cell technology

The 3rd section of the table to be changed as follows:

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| Thin Film Technology | Are made by depositing thin films of silicon directly onto a glass or stainless steel  substrate a thin slice cut from a single large crystal of silicon.  The cell has a lower efficiency than either of other technologies but can be multi-layered  for enhanced performance. Problems have been found with lifetime of these cells. |

* Page 141 – 7.2.1 Solar Power (Photovoltaic cell) - Types

Amend the 2nd paragraph as follows:

In addition to the silicon cell technologies, there are two optional module configurations based on the numbers of series connected cells. The standard module normally has 36 cells in series to give an open circuit voltage of around 20 volts. For all battery charging applications, a voltage (charge) regulator is considered essential.

Remove paragraphs 3 and 4 if none of the committee members use self regulating solar panel systems.

Add the following paragraph:

Modern developments in electronics have allowed new voltage (charge) regulators to be developed that use maximum power point tracking (MPPT). This ensures that they operate the solar module at a level to obtain the maximum power, for any given level of irradiance. This operating level is independent to the battery charge voltage level. This technology can lead to up to 30% more output than would be achieved with conventional voltage regulators.

* Page 141 – 7.2.2 Wind Energy – Aids to Navigation Application

Changes as follows:

Wind generators (or wind turbines) have been used by a number of IALA Members to power aids to navigation. The most popular type were horizontal axis machines with a two or more bladed (propeller type) turbine. The maintenance requirements arising from the number of moving parts of a wind generators and the susceptibility to storm damage, has limited the use of wind generators.

* Page 141 – 7.2.2 Wind Energy – Installations

Delete the final bullet point,

and replace with the following:The operation of wind generators to power aids to navigation needs to take into account the impact it may have on any environmental factors associated with the location, such as; flora, fauna, birds, etc.

* Page 142 – 7.3.1 Principal types

Amend the 2nd paragraph as follows:

The lead acid type is generally preferred because of its lower cost and higher energy exchange efficiency (up to 95% vs. 80%) than the nickel cadmium battery. However, the nickel cadmium battery can operate in lower temperatures and for a greater number of deep discharge cycles.

And the 3rd paragraph as follows:

Recently, new secondary battery technologies have appeared, including lithium batteries, nickel-metal-hydride (Ni-MH) batteries and lithium-iron phosphate (LiFePO4) batteries. All of which offers lower weight and longer life span from more charge-discharge cycles, for a given capacity.

* Page 143 – 7.3.1 Principal types – Lead Acid

Amend the 1st paragraph as follows:

The basic form of this battery uses a lead dioxide positive plate and a pure lead negative plate immersed in an electrolyte of dilute sulphuric acid. These were originally wet or flooded cells. However in recent years various forms of “sealed” cell batteries have become available and are quite common in aids to navigation applications.

* Page 144 – 7.3.2 Primary Cells – Sea-water Cells

Amend the 3rd paragraph as follows:

Copper was selected for the cathode material because of its inherent antifouling properties. A magnesium anode was considered environmentally acceptable because it is a naturally occurring element of sea water. The cell produces a voltage of 0.8 to 1 volt under load.

And the 4th paragraph as follows:

ADC-DC converter is used to raise the voltage to the level required by the load as it is impractical to use more than one cell due to the current leakage that would occur.

* Page 144 – 7.3.3 Internal Combustion Engine/Generators – Diesel Generators

Add to the 2nd paragraph as follows:

The generator capacity to support the operational and domestic loads of a standard lighthouse is in the range of 10 to 30 kW. Diesel generators of this size are expected to consume around 0.4 litres/kWh. However, smaller generators in the range of 2 to 5kW, combined with batteries and inverter-charger systems are now available to meet this variable load demands.

* Page 145 - 7.3.3 Internal Combustion Engine/Generators – Fuel cell

Amend the 1st paragraph as follows:

This is a solid-state device that uses a catalytic process to oxidise fuel to generate an electrical current. A common fuel is Hydrogen, or Hydrogen rich fuels such as Methanol. It can be thought of as a continuously fed battery ideally preferring a constant load.

And the 2nd paragraph as follows:

The commercial fuel cell is still adeveloping technology and at this stage is an expensive power source40. Aids to navigation applications are likely to be limited to situations where solar energy (photovoltaic) is impractical due to limited insolation or icing conditions.

Add a 4th paragraph as follows:

Fuel cells do present an environmentally suitable solution, as Methanol can be manufactured from sustainable sources and the byproducts of the generation of electrical energy is heat and water.

* Page 145 - 7.4.1 Electrical Loads

After all the bullet points add the following reference:

**Refer to IALA publication:**

*IALA Guideline 1011 On A Standard Method For Defining And Calculating The Load Profile Of Aids To Navigation*

* Page 146 – 7.5 Non-Electric Energy Sources – Acetylene

Does anybody use Acetylene for aids to navigation, given the use of solar and the difficulties in the manufacture of the gas mantles? If not, then this section can be removed and Acetylene removed from table 23 on page 139.

* Page 146 – 7.5 Non-Electric Energy Sources – Propane

Amend the 1st paragraph as follows:

Propane gas (C3H8) has been used as an alternative fuel to acetylene, particularly in buoys. Although propane has to be consumed in an incandescent mantle burner to provide a white light, it has several advantages over acetylene:

* Page 130 – 6.5.4 Range of a Sound Signal

The current recommendation distinguishes between ‘nominal range’ and ‘usual range’. To reduce confusion a single definition should be used. As such it is recommended that Table 20 be removed.

The sound pressure values in Table 19 have been challenged and it is suggested there are errors. As such it is recommended that all measurements in Table 19 are recalculated and adjusted as required.

The Pn(NM) / f(Hz) box should be better clarified so it is clearer as to which axis the measurement is relevant to.

* Page 67 – 3.2.6 Buoys

Amend the first bullet point as follows.

where lights are exhibited they are usually solar or ~~single cycle~~ primary battery powered, however gas powered buoys are still in operation;

Moorings - section 3.2.6

* Page70

Bottom of page ‘Refer to IALA publications’ Include in this box the new Guideline on Daymarks 1094 and the Guideline on the Hydrostatic Design of Buoys; when approved.

* Page 71 –Mooring Design and Swing Radius

Amend the first paragraph as follows.

The mooring system for a floating aid to navigation is the sum of the components that keep the aid within a nominated area. These components have to withstand the forces of wind, wave and current on the floating aid and drag on the mooring line. Methods for determining the forces are covered in the IALA Guideline 1066 on the design of Floating Aid to Navigation Moorings. The basic assumptions made are that the:

Amend the first bullet point as follows.

mooring chain is usually tangential to the sea bed ~~under all conditions of current and wind at the site;~~

* Page 71 – Swing Radius

Delete the Swing Radius heading and delete the sentence starting ‘The following formula—‘

Change the next sentence to ‘An approximate value for the minimum length of a chain mooring is given by the following formulae’ The formulae to remain.

After the formulae include a new heading ‘Swing Radius’ followed by the text ‘Details are provided for the calculation of the swing radius and for the design of site specific moorings in the Guideline 1066.’

* Page 72 – 3.2.6 Markings and Topmarks

Make the following edit of the second sentence under Topmarks.

Topmarks can be conical, cylindrical, spherical or a cross ~~which can be either diagonal or vertical / perpendicular~~.

* Page 35 – 3.2.1 Gas Lights

The last paragraph on the page should be moved directly underneath the title heading for 3.2.1 Gas Lights as it is currently in the incorrect location.

The first paragraph on Acetylene should be edited as follows.

~~The acetylene light has a special place in the history of aids to navigation, primarily for being the first reliable means of automating lighthouses, buoys and beacons during the earlier part of the 20th century.~~ Acetylene lighting systems originated from the inventions of Gustaf Dalen and were made by a number of suppliers. Acetylene gas has the unusual property of burning with a white flame when correctly mixed with air. This enabled the development of exceptionally reliable open flame lanterns.

* Page 35 – 3.2.1 Propane and Butane

The first paragraph should be edited as follows.

Propane ~~and butane~~ gas ~~have~~ has been used as fuel~~s~~ for gas lighting systems. The lighting equipment has to use an incandescent mantle burner as ~~both gases~~ the gas burns with an yellow/orange flame~~s~~ when an open flame burner is used.

* Section 8.10 Environment

Reviewed, no change proposed. (The link to guideline 1036 does not work)

* Section 8.11.1 Lens size and Terminology

Reviewed, no change to text proposed.

Add a reference to Guideline 1049 - *The Use of Modern light sources in Traditional Lighthouse Optics*

* Section 8.11.2 Third Party Access to Aids to Navigation Sites

Add following sentence after the last bullet point but before the last sentence. page 179

“Where practical the complimentary use of existing structures or accommodation should be considered as an alternative to a new construction with its consequential environmental impact.”

Add a reference to Guideline 1063 - *Agreements for Complimentary use of Lighthouse Property*

* Section 8.12 Human Resources Issues

Paragraph 2 – STCW is not in the glossary, include “(Standards of Training & Certification for Watchkeepers)” or add to the glossary on page 14

Paragraph 3, last sentence – change “currently studying the training requirements” to “*currently developing the training requirements for AtoN Management and Engineering Personnel through the WWA.*”

* Section 8.12.1 – Source of Skills

Reviewed, no changes proposed

* Section 8.12.2 – Training for Maintenance Personnel.

Section to be deleted; information contained in IALA WWA revised entry (EEP20/output/7).