Document Revisions (Title style)

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**IALA Guideline No. ####**

**On**

**The Illumination of Structures**

**Edition 1**

**[October 2013]**

Revisions to the IALA Document are to be noted in the table prior to the issue of a revised document.

|  |  |  |
| --- | --- | --- |
| **Date** | **Page / Section Revised** | **Requirement for Revision** |
| EEP 16  Input Paper  EEP-INF-6 | Colourwash Floodlighting of Lighthouses for IALA Bulletin | To be worked on |
| EEP 19  Input Paper  EEP 19/90 | Light Applications for Illumination of Structures in Korea | To be worked on |
| EEP 20  Presentation  Document No. 99 | Calculation of Light | To be worked on |
| EEP 21  Input Paper  EEP 21-11-2-3 | Examples of Design Illumination of Structures in Korea | To be worked on |
| Annex A of this Draft Guideline | Checklist for Floodlighting | To be worked on |
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Illumination of Structures

# Introduction

* + Why illuminate the structure?
    - Fixed visual point of reference – Useful?
    - Conspicuity against background lighting – Useful?
    - Extended source of light
    - Should be in conjunction with an existing AtoN
    - It extends the daytime operation to night
    - 3D spatial awareness – depth perception
    - Ricco’s Law
    - LED Technology has allowed low power ‘emissive’ coloured lighting

# background

# scope

* + - Authorities have been using this and required Guidance, sharing good practices and providing Guidance

# definitions

# basic principles

* + Methods of Calculating
  + Use simulations generated in software
  + In-direct lighting – floodlighting or façade
    - Luminance
    - Illuminance
    - Angular sub -tense
  + Direct ‘emissive’ lighting – LED Pipes, ropes, contour, panels
    - Luminance
    - Illuminance
    - Angular sub-tense

# light sources

* + Fluorescent
  + LED
  + Sodium
  + Metal halide

# applications

* + Methods of Design
  + Lighthouses
  + Buoys
  + Bridges
  + Leading lines
  + Locks
  + Break water
  + Windfarms

1. Annex Title

Guidelines should have Annexes. Appendices are attached to Annexes.

ANNEX HEAD1

Body Text

To restart the Annex Heading numbering at 1:

* Office 2003, go to Format / Bullets and Numbering / Restart numbering (lower left in the box)
* Office 2007, go to down arrow next to Numbering icon and select Set Numbering Value

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**Annex A**

**Checklist for Floodlighting**

Source: Jörg Unterderweide (German Federal Waterways)

**Checklist for Floodlighting**

**Light**The lamp is the determining element for the design of the entire lighting system. Therefore, initially, requirements are required for the luminaire. These requirements are derived from DIN 67500 as well as the local conditions. The underlying requirements dictate the discretion of the system designer. As a follow up, compliance with the required quality characteristics can be tested by measurements of the constructed facility.

The factors listed below as a checklist of interpretation to be considered. Some of them are provided with further explanations.

**Design**

* The lights should be equipped with bird spikes to reduce the risk of bird fouling.
* A rounded shape is recommended, because experience has shown that any existing sharp corners and small spaces become inhabited by insects which can reduce light intensity.
* The cover glass should be flat (anti-glare) and set within a housing that is slightly larger to throw off rainwater (and the associated pollution).
* Housings without cooling fins are preferred. If cooling fins are required, these should ideally be located on the side of the housing. Cooling fins located on top of the housing can be subject to debris from dirt, leaves, etc.

**Housing**

Bright colour is preferred for the housing, as it reflects sunshine related heat. The casing has an influence on the temperature inside the luminaire. Measurements have shown that in dark housings, temperatures in the luminaire have range from 70 °C to 100 °C before activation. The temperature drops off significantly after midnight. The lamp will not operate until then under standard conditions.

A suitable IP rating should be selected to provide adequate protection. A minimum of IP65 can prevent insect infestation and reduce routine cleaning. When using LED technology, a minimum rating of IP65 should be adopted due to the humidity sensitive technology.

**Modularity**

Modular structure should be considered, i.e., separate modular component as follows:

* light source
* housing
* optics (lenses , reflectors, glass cover)
* power supply / control
* lenses should be vandal proof, UV stable and deliver light intensity distribution
* light intensity distribution documentation to comply with international standard EULUMDAT with the following minimum requirements :
  + 5 ° angular resolution in the C-plane
  + 2.5 ° angular resolution in the G-plane

**Light color**

White < 4500K (neutral white and warm white)

**Installation and Maintenance**

Maintenance of the units should be possible with minimum tools.

To optimize spare parts inventory, tendering should be considered for larger areas to ensure optimum spare parts. These areas would normally be equipped with uniform lighting. Alternatively, areas can be equipped with lights that have a high proportion of identical, interchangeable or equivalent connection components.

It is advisable to ensure the supply of spare parts for the long term .

**Thermal management**

The lamp is designed so that the heat is dissipated. If the thermal management is not sufficient, it may lead to early failures.

The manufacturer should provide documentation to show calculations and measurement results for the thermal management.

The thermal management must not contain active components.

**Failure rates of Components**

The manufacturer shall project the useful life and failure rates (MTBF) of the specific components used on the basis of experience or calculations. These requirements affect the parameters of the economic cost benefit analysis such as replacement intervals for preventive maintenance.

**Adjusting Illuminance**

An event-driven dimming system is recommended. The following events should be considered:

* lights switched off, for example in day mode
* reduced (off) lighting power when it is not needed, for example “Out of Hours”
* nominal illumination, for example in night mode
* customised illumination, for example:
  + level-dependent dimming in lock shafts
  + local adaptation by increased illumination in the certain areas
  + temporary adjustment to provide assistance at the exit of lock
  + directional units to defined areas in order to reduce glare towards vessels, provided that this is technically feasible
  + increased illumination, for example during construction activity

**Maintenance Factor**

According to DIN EN 12464-2 [12], the lighting system should be designed with a maintenance factor calculated for the proposed lighting device, the physical environment and the established maintenance schedule. The designer (contractor) must

* specify the maintenance factor
* perform all the assumptions that were made in determining the value, as well as
* create a maintenance plan
  + the interval for changing the lamp,
  + the interval for cleaning the luminaire, and
  + cleaning methods.