**Input paper:** XXXX-n.n.n

**Input paper for the following Committee(s):** **Purpose of paper:**

(Select as appropriate)

ARM  ENG  PAP  Input

ENAV VTS  Information

**Agenda item** n.n

**Technical domain/ Task number** 2.1.4

**Author(s)/Submitter(s)** Task Group (submitter Task Group Leader)

# Develop e-112 leading lights and G1023 leading lines into a guideline – intersessional working and status

# Summary - EXAMPLE OF HEADING 1 STYLE

The Annex A to this input paper describes the intersessional work of WG1 Task Group Leading Lines/Lights and should be read together with the italicised documents below

# References

1. IALA. (2005) Recommendation R0112 Leading Lights
2. IALA. (2005) Guideline G1023 The Design of Leading Lines
3. IALA. (2001) Design of Leading Lines Program (Excel Workbook)
4. IALA. Task 2.1.4 Develop e-112 leading lights and G1023 leading lines into a guideline October 2023
5. IALA. Report ENG 13, Action item 29 Input paper: IALA Documents on Leading Lines April 2020 (ENG 14)
6. IALA. (2020) ENG14-3.1.1.2 Revised G1023 on Design of Leading Lines
7. IALA. (2020) ENG14-3.1.1.4 Spreadsheet Tutorial
8. IALA. (2020) ENG14-3.1.1.3 Revised Leading Line Design Programme E-112-2
9. Task 2.1.4 Review of Leading Lights and Lines documentation - update ENG18 V2
10. IALA. (2021) Guideline G1148 Determination of Required Luminous Intensity for Marine Signal Lights
11. Design Intensity and Intensity Ratio Formulas – Excel Spreadsheet intersessional work by Partel Keskula

# Action requested of the Committee

The Committee is requested to:

1. Note the contents of the intersessional working report
2. intersessional working
   1. Purpose

The purpose of this paper is to:

* Summarise the work previously undertaken by WG1 on the review of the Leading Lights Recommendation *R0112 Leading Lights* [1]and Guideline *G1023 the Design of Leading Lines* [2]and its accompanying Excel workbook [3].
* Update the Committee on the work undertaken since ENG19 under Task 2.1.4 [4]
  1. Background

At ENG 14 (Autumn 2021) Frank Herman (German Federal Waterway and Shipping Administration) and Partel Keskkula, (Estonian Transport Administration) presented a review of the relevant IALA publications relating to leading lines in input paper under ENG13 Agenda Action Item 29 [5].

This reviewed the three existing documents:

* Recommendation R0112 (E-112) Leading Lights
* Guideline G1023 The Design of Leading Lines
* Leading Line Design Programme (MS Excel workbook)

The ENG14 input paper states that the review was carried due to inconsistencies in definitions and dimensions used between the Recommendation, Guideline and Excel workbook and some general errors.

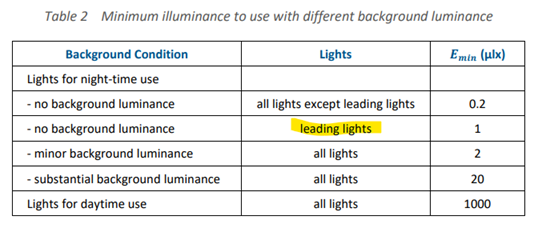
Partel and Frank revised the documents in accordance with Figure 1 and the relevant output from ENG 14 was a series of documents as follows:

* ENG14-3.1.1.2 Revised G1023 on Design of Leading Lines [6] – A revised Guideline that contains material from the Recommendation R0112 and the existing G1023 Guideline.
* ENG14-3.1.1.4 Spreadsheet Tutorial [7] – An explanatory document to assist users of the Excel workbook.
* ENG14-3.1.1.3 Revised Leading Line Design Programme E-112-2 [8] – A revised Excel workbook with modified parameters. Note that there are two versions of the spreadsheet in the Leading Lines folder in the output from ENG14. It is not immediately clear which one should be used.

It was suggested that the Recommendation was withdrawn completely.

* 1. Progress of Working Group since ENG 19 (see also ENG 18 summary paper [9])
* The WG agreed to retain Recommendation in principle; Leading Lines and Lights is a specific situation that requires a recommendation on the separation and sensitivity parameters.
* The WG met five times for 1.5 – 2-hour sessions between October 2024 and March 2025 to collectively review Guideline G1023. Although there has been much discussion and editing of the document, progress on the main text is still not substantially complete. The working paper attached to this input document is the status of the Guideline being edited.
* The WG will review at ENG 20 if a more targeted and efficient review of the Guideline could accelerate progress.
* The resulting Guideline remains a detailed and potentially overwhelming document for those new to design of leading lights; the WG will therefore further review the sectional content of the Guideline before continuing review of the detailed information.
* Two further items for specific discussion and consideration at ENG 20 are:
* 6.2.2. Design Luminous Intensity of Front Light

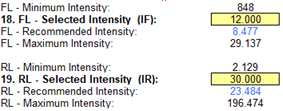
The first paragraph recommends calculating minimum light intensity according to IALA Guideline G1148 [9] . In G1148 there is a specific recommended Illuminance value for leading lines at nighttime:



So, as far as we understand, G1148 already contemplates specific intensity calculation for leading lights, with an illuminance value 5 times higher than usual. Continuing with section 6.2.2, there are two methods to obtain the recommended design intensity for the front light:

1. The first method multiplies the calculated (as per G1148) minimum intensity x2 or x10, depending on whether the range is less or greater than 5nm. The “arbitrariness” of this method raises some questions: Where does these values come from? Are they values obtained empirically? Could it be that these values were set before the last modification of G1148 (2019)? Could we be overlaying safety factors that result in light oversizing?
2. On the other hand, there is a second alternative method, referred to as the German simplified method. The results of this method at short ranges are extremely different from those obtained by the previous method. Pärtel has been kind enough to make a comparison between the formulas in attached document [11] . Should we specify more in which cases it would be a good idea to use this simplified method? Does it make sense for IALA to recommend two methods that give such different results?

In addition, when using the official leading-line-design-programme-v2 (Excel tool), it gives a recommended intensity in blue:



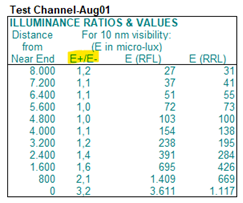
Does the program's calculation method match any of those mentioned above? It may be that it always uses method 1 in its x10 version? Does it make sense to recommend different methods in the Guideline than the results we are getting with IALA programme? Will it be confusing for users? We do not want to remove any contributions that other people have made to the document without understanding their origin. Our intersessional working group currently lacks the information to be able to decide on this point.

* 6.2.3. Design Luminous Intensity of Rear Light

The calculation of the rear light intensity is based on an ideal ratio, where the illuminance of front and rare lights is as equal as possible throughout the useful segment. It is recommended to calculate the ratio in the middle of the channel and at the far end, showing different solutions according to the results obtained.

This process is a bit long and confusing. Would there be a simpler way to explain this point? Can another way of calculating the rear light be studied? Can the rear light be calculated according to the previous section, and then check the ratio between the front and rear lights?

In the IALA Excel tool we can select intensities iteratively and it automatically calculates the ratio at 10 points along the channel. It is as simple as checking whether the selected intensities result in a ratio close to 1.



* 1. Anticipated actions of WG at ENG20 to include
* Review of progress and current document to facilitate acceleration of Guideline completion and progression to other Leading Line/Light documents.
* Consideration and resolution of the two points under sections 6.2.1 and 6.2.3, respectively.