 Input paper: [[1]](#footnote-1) ENG4-9.15

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

**□** ARM **X** ENG **□** PAP **X** Input

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

Agenda item [[2]](#footnote-2) 9

Technical Domain / Task Number 2 TD#1 - Light and vision physics, Visual Signalling / 34

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Aspects of leading lines from Finnish Guidelines

# Summary

In ENG3 members were requested to familiarise themselves with the documents relating to Recommendation E-112 for Leading Lights and Guideline 1023 on the Design of Leading Lines and provide input papers to ENG4 to support the update.

## Purpose of the document

The input is presented for information and considering including relevant parts in the IALA Guideline.

## Related documents

Guideline 1023 for the Design of Leading Lines

# Background

The paper includes parts or aspects from Finnish guidelines on leading lines that are not covered in the IALA guideline.

# Discussion

## Concept of channel width vs distance to most the dangerous obstruction from the Finnish guidelines

Finnish guidelines use the concept of most dangerous obstruction instead of the width of the channel. Most dangerous is considered to be the obstruction at which the angle between axis of a leading line and the line drawn to the obstruction as seen from the front leading mark is smallest.

At first sight it may seem more complicated but in case of no clearly defined channel but isolated shallows the Finnish one would be more accurate approach. Besides it also covers the case of a channel where the most dangerous would be the far end of the channel.

## Use of retroreflecting film on leading marks in Finnish guidelines

“Reflectors are mostly used as alternatives to lights on small craft routes and other less important roures. However, they have importance on lighted fairways as well in case of failure of a light.

At first, the light source is selected for observing the reflectors. On small crafts 10 000 cd and on ships ca 100 000 cd search lights can be expected.

Then the minimum size of the reflector can be calculated by the formula:

A = D4E/ IR0,052D/18520 (2.4.1)

Modified for the treshold of illuminance:

E = AIR0,052D/18520/ D4 (2.4.2)

A – area of the reflector [m2];

E – treshold of illuminance [lx];

D – observing distance [m];

I – intensity of the light source [cd];

R – reflecting coefficient of the reflector [lx/m2/cd]. *(At 3M web page it is cd/lux/m2)*

In principle the calculations can be made as for lights but, as the main purpose is to get strong enough reflection, maximum values need not to be calculated. Retroreflecting film is placed on the middle stripe of the leading mark so that it covers ¾ of that stripe, and a quarter of the area of the whole daymark. Film of the front mark begins from the lower edge of the daymark and the film of the rear mark begins from the upper edge of the daymark (so that that the reflectors will not blur making using the leading line difficult). The reflection is decreasing very fast with the distance and the maximum distance does not exceed 4000 m even with powerful searchlights. In practice the distances are 0 ... 2500 m are used. The colour of the reflector is always white.

When the areas to be covered with the reflectors are determined the value of E is determined for both marks with the formula (2.4.2).”

## Using semi-transparent material for enhancing conspicuity/contrast of daymarks observed against the sun

Finnish recommendations have mentioned that using semi-transparent material on daymarks could enhance conspicuity/contrast of daymarks observed against the sun. Attached is a picture from Finnish inland waters where sun from back of the leading mark in foreground makes its dayboard more conspicuous by making it shine.



1. A semi-transparent daymark glowing in sunlight on Finnish inland waterways (left)

# References

1. *Vesiväylien linjalaskennan perusteet. 2-2013. Liikennevitaston oppaita* <http://www2.liikennevirasto.fi/julkaisut/pdf3/lop_2013-02_vesivaylien_linjalaskennan_web.pdf>

# Action requested of the Committee

The Committee is requested to:

1. Review the input paper during the discussion of Guideline 1023 for the Design of Leading Line

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