



# IALA RECOMMENDATION (NORMATIVE)

## R0204 (E200-4) MARINE SIGNAL LIGHTS - DETERMINATION AND CALCULATION OF EFFECTIVE INTENSITY

**Edition 3.0**

June 2022

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# DOCUMENT REVISION

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

Date	Details	Approval
December 2008	1 <sup>st</sup> issue	Council 44
December 2017	Entire document: Modified Allard method adopted. Review and alignment with IALA strategy. Document style updated. Descriptive content removed to a Guideline.	Council 65
September 2020	Edition 2.1 Editorial corrections.	
June 2022	Edition 3.0	Council 75

# THE COUNCIL

## **RECALLING:**

- 1 The function of IALA with respect to Safety of Navigation, the efficiency of maritime transport and the protection of the environment;
- 2 Article 8 of the IALA Constitution regarding the authority, duties and functions of the Council;

## **RECOGNISING** that:

- 1 for the adequate performance of marine signal lights, the performance of flashing lights needs to be determined;
- 2 there are several methods of determining the performance of flashing lights at the threshold of visual perception; and
- 3 there are no adequate methods for determining the performance of flashing lights at observer levels above the threshold of illuminance;

## **NOTING** that:

- 1 defined standards for the determination of the performance of flashing lights should be used worldwide to ensure the quality of signal lights for mariners; and
- 2 this document only applies to Marine Aid-to-Navigation signal lights that are installed after the publication date of this document;

**CONSIDERING** the proposals of the AtoN Engineering and Sustainability Committee, the Committee lights experts and the Committee IALABATT/IALALITE working group;

**ADOPTS** the Recommendation on Marine Aid-to-Navigation Signal Lights - Determination and Calculation of Effective Intensity;

**RECOMMENDS** that IALA Members and other appropriate Authorities providing Marine Aids to Navigation adopt the Modified Allard Method described in annex A for the determination and calculation of effective intensity of a rhythmic light;

**ALSO RECOMMENDS** that the Modified Allard Method be applied to individual flashes in isolation, with the effective intensity for the flash character being that of the lowest value of all the flashes in the character;

**REQUESTS** the AtoN Engineering and Sustainability Committee or such other committee as the Council may direct to keep this Recommendation under review and to propose amendments, as necessary.

## ANNEX A MODIFIED ALLARD METHOD

### A.1. MATHEMATICAL DESCRIPTION

In the Modified Allard Method, the effective intensity,  $I_e$ , of a finite length flash is determined by the maximum value of the convolution result between the flash profile and the visual system response function. Thus (Equation 1),

$$I_e = \max_t \left\{ \int_{-\infty}^{+\infty} I(t-t') \cdot q(t') dt' \right\} \quad (1)$$

Where:

$I(t)$  is the instantaneous luminous intensity of the flash at a time  $t$ .

$q(t)$  is the visual system response function.

The visual system response function,  $q(t)$ , is determined by Equation 2:

$$q(t) = \begin{cases} \frac{a}{(a+t)^2} & \text{for } t \geq 0 \\ 0 & \text{for } t < 0 \end{cases} \quad (2)$$

Where:

$$a = \begin{cases} 0.1 \text{ s} & \text{for all signal colours except blue at night} \\ 0.2 \text{ s} & \text{for blue signal colour at night} \end{cases}$$