

# RECOMMENDATION

R0204(E200-4)

## MARINE SIGNAL LIGHTS - DETERMINATION AND CALCULATION OF EFFECTIVE INTENSITY

**Edition 2.0**

**December 2017**



# DOCUMENT HISTORY

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Revisions to this IALA 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

# 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;
- 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;
- 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;

**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,

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

#### **Equation 1: Modified Allard Method**

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:

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

#### **Equation 2: Visual System Response Function**

Where:

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