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| IALA Recommendation |

R0203

on Defintions of Marine Signal Lights Terms of Measurement

Edition 2.0

Document date

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

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| Date | Page / Section Revised | Requirement for Revision |
| 4 Dec 2008 |  | Edition 1 |
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THE IALA 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**:

1. that for the adequate performance of marine signal lights, both their photometric and colorimetric parameters have to be ensured;
2. that a great variety of light sources have been and are still being developed;
3. that there are many different methods and equipment for the measurement of light.

**NOTING** that

1. defined standards for photometry and colorimetry should be used worldwide to ensure the quality of signal lights for mariners;
2. that this document only applies to marine Aid-to-Navigation signal lights that are installed after the publication date of this document;
3. that there should be available laboratories, which are working according to this documentation, for all IALA members and other appropriate Authorities which could be operated by themselves, by other Authorities in the same country or another country, or by private companies;

**CONSIDERING** the proposals of the ENG Committee,

**ADOPTS** the Recommendation on Marine Aid-to-Navigation Signal Lights in the Annex of this recommendation; and,

**INVITES** Members and marine aids to navigation authorities worldwide to implement the provisions of the Recommendation,

**RECOMMENDS** that

* National Members and other appropriate Authorities providing marine aids to navigation services carry out photometric and colorimetric measurements of Marine Aid-to-Navigation Signal Lights in accordance with this recommendation;
* Industrial Members shall specify the performance of their visual aids-to-navigation in accordance with this recommendation;

**REQUESTS** the ENG Committee or such other committee as the Council may direct to keep the Recommendation under review and to propose amendments as necessary.

**REVOKES** IALA Recommendation E-200-3 Edition 1.

1. Definitions of marine signal Lights Terms of Measurement
2. Overview

The definitions contained within this annex should be considered as the minimum requirement in terms of luminous intensity and colour when reporting on the performance of a Marine Signal Lights. Where additional definitions are required for a particular application, they shall not conflict with definitions given below.

1. measurement Geometry

The measurement geometry is that of a Goniometer Type 1. The datum is defined as 0° horizontal and 0° vertical.

Make reference to CIE Documents CIE 43 Photometry of Floodlights 1979 and remove CIE 121 1996.

1. Luminous Intensity versus Angle

In this section, we define terms that are related to the measurement of luminous intensity as a function of horizontal and vertical angle. This would describe the performance of the light based on the direction that it is viewed from.

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| **Vertical Divergence** | The average of all measured Full Width Half Maximum (FWHM) values shall be reported as the vertical divergence, along with the maximum deviation of the maximum intensity from horizontal (datum). |
| **Horizontal Divergence** | The Full Width Half Maximum (FWHM) values as measured along the horizontal plane shall be reported as the horizontal divergence. If the intensity does not fall to half maximum at any point around the light, then the horizontal divergence is 360°. |
| **Intensity** | * Omnidirectional light: the intensity is defined as the 10th percentile of the intensity measured around the entire light at an elevation of 0°. * Directional light without a required boundary: the intensity at the horizontal and vertical datum. * Sector intensity: the intensity is defined as the 10th percentile of the intensity measured between the sector boundaries at an elevation of 0°.   The intensity of a sector shall be defined as the 10th percentile of the intensity measured across the sector either between the Full Width Half Maximum points that define the Horizontal Divergence or between the Sector Colour Boundaries ~~defined by colour~~, whichever is the smallest angle. |

1. Luminous Intensity versus Time

In this section, we define terms that are related to the measurement of luminous intensity as a function of time.

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| **Flash Duration** | The duration of the measured flash profile should be taken from the point in time when the intensity first exceeds 50% of the peak intensity value to the point in time when the intensity finally falls below 50% of the peak intensity value. The end of a flash should be considered as when the intensity falls below 5% of the peak intensity value for more than 100 ms. |
| **Effective Intensity** | The effective intensity shall be determined using the method described in IALA Recommendation R0204. The effective intensity shall be scaled to represent the 10th percentile intensity of the sector being measured.  When a group of flashes make up a flash character, the reported effective intensity shall be that of the lowest flash effective intensity in the group. |
| **Nominal Range** | The nominal range shall be determined using the reported effective intensity by applying the method described in IALA Recommendation R0202. The application of performance measurement uncertainty shall allow for 95% confidence in the result. |

1. Colour and Sectors

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| **Signal Colour** | The measured colour of the light should be reported in x, y coordinates according to the CIE 1931 chromaticity chart. Compliance, or not, with the appropriate IALA colour region should also be reported with reference to IALA Recommendation R0201. |
| **Sector Colour Boundary** | The sector colour boundary is the angle at which the colour of the sector first exits the colour region as defined in IALA Recommendation R0201. If Sector Colour Boundaries of the same Signal Colour occur with 0.1° of each other, then only the Sector Colour Boundary that is closest to the main body of the sector shall be recorded. |
| **Sector of Uncertainty** | The Sector of Uncertainty shall be the largest angle between adjacent recorded Sector Boundaries. |

1. References

CIE. (2004). *Standard S 010/E:2004 - Photometry - The CIE System of Physical Photometry.*

CIE. (2018). *Technical Report 015:2018 - Colorimetry.*