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| IALA RECOMMENDATION |

DRAFT

Marine Signal Lights

Calculation, Definition and Notation of Luminous Range

Edition x.x

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 |
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THE COUNCIL

**RECALLING** the function of IALA with respect to Safety of Navigation, the efficiency of maritime transport and the protection of the environment;

**RECOGNISING** the need to publish the performance of marine signal lights;

**RECOGNISING ALSO** the need to specify, design and quantify the performance of marine signal lights worldwide;

**NOTING** this document only applies to marine Aid-to-Navigation lights installed after the date of this publication;

**ADOPTS** the tables and charts in the annex of this recommendation; and,

**RECOMMENDS**

* that National Members, other appropriate Authorities and manufacturers providing marine aids to navigation services design, specify and publish the performance of marine Aid-to-Navigation signal lights in accordance with this recommendation.
* that all luminous range calculations are based on Allard’s law:

Where: *I* is the luminous intensity of the light [cd]

*Er* is the required illuminance at the eye of the observer [lx]

*D* is the luminous range in metres [m]  
*V* is the meteorological visibility in metres [m]

* that the Nominal Range of a maritime signal light is calculated for a meteorological visibility of 10 nautical miles (18 520 m) and an illumination at the eye of the observer:
  + of 2 × 10-7 lx for night time range
  + of 1 × 10-3 lx for day time range
* that the Nominal Range of lights intended for the guidance of shipping should be published in the “Lists of Lights”. The following information should be published:
  + The nominal range of lights intended for the guidance of shipping by night;
  + Where applicable, the nominal range of lights intended for the guidance of shipping by day;
  + Nomograms permitting mariners to estimate the luminous range of lights intended for the guidance of shipping by day or by night as a function of their nominal range and the prevailing meteorological visibility.
* that the intensity used for range calculation takes into account the influence of the flash character and profile (effective intensity);
* that the calculation takes into account a service condition factor.

1. LUMINOUS RANGE FOR NIGHT TIME

The chart is based on an illuminance is .



1. Luminous Range Diagram - Night Time
2. Night time nominal range table (rounded off to the nearest nautical mile)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Luminous  intensity | Nominal range (rounded) | Luminous intensity | Nominal range (rounded) | Luminous intensity | Nominal range (rounded) |
| candelas  (cd) | nautical miles (M) | kilocandelas  (103 cd) | nautical miles (M) | Megacandelas  (106 cd) | nautical miles (M) |
| 1 - 2 | 1 | 0.633 – 1.06 | 9 | 0.927 – 1.35 | 26 |
| 3 - 9 | 2 | 1.07 – 1.75 | 10 | 1.36 – 1.96 | 27 |
| 10 - 23 | 3 | 1.76 – 2.84 | 11 | 1.97 – 2.84 | 28 |
| 24 - 53 | 4 | 2.85 – 4.53 | 12 | 2.85 – 4.11 | 29 |
| 54 - 107 | 5 | 4.54 – 7.13 | 13 | 4.12 – 5.93 | 30 |
| 108 - 203 | 6 | 7.14 – 11.1 | 14 | 5.94 – 8.53 | 31 |
| 204 - 364 | 7 | 11.2 – 17.1 | 15 | 8.54 – 12.2 | 32 |
| 365 - 632 | 8 | 17.2 – 26.1 | 16 | 12.3 – 17.5 | 33 |
|  |  | 26.2 - 39.7 | 17 | 17.6 – 25.1 | 34 |
|  |  | 39.8 – 59.9 | 18 | 25.2 – 35.9 | 35 |
|  |  | 60.0 – 89.8 | 19 | 36.0 – 51.2 | 36 |
|  |  | 89.9 - 133 | 20 | 51.3 – 72.9 | 37 |
|  |  | 134 -198 | 21 | 73.0 - 103 | 38 |
|  |  | 199 - 293 | 22 | 104 -147 | 39 |
|  |  | 294 - 432 | 23 | 148 - 209 | 40 |
|  |  | 433 - 634 | 24 |  |  |
|  |  | 635 - 926 | 25 |  |  |

1. LUMINOUS RANGE FOR DAYTIME

The chart is based on an illuminance is .



1. Luminous range diagram – day time
2. Day time nominal range table (rounded off to the nearest nautical mile)

|  |  |  |  |
| --- | --- | --- | --- |
| Luminous  intensity | Nominal  range (rounded) | Luminous intensity | Nominal range (rounded) |
| kilocandelas  (103 cd) | nautical miles (M) | Megacandelas  (106 cd) | nautical miles (M) |
| 1 – 12.0 | 1 | 1.02 – 1.82 | 7 |
| 12.1 – 45.3 | 2 | 1.83 – 3.16 | 8 |
| 45.4 – 119 | 3 | 3.17 – 5.32 | 9 |
| 120 – 267 | 4 | 5.33 – 8.78 | 10 |
| 268 – 538 | 5 | 8.79 – 14.2 | 11 |
| 539 – 1010 | 6 | 14.3 – 22.6 | 12 |
|  |  | 22.7 – 35.6 | 13 |
|  |  | 35.7 – 55.5 | 14 |
|  |  | 55.6 – 85.6 | 15 |
|  |  | 85.7 – 130 | 16 |
|  |  | 131 – 198 | 17 |