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| IALA Recommendation |

E-108

ON The Surface Colours used as Visual Signals on Aids to Navigation

Edition 3.0

May 2013

Revokes IALA Recommendation on the surface colours used as visual signals on aids to navigation dated May 1998.

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 |
| December 2005 | Entire document | Reformatted to reflect IALA documentation hierarchy |
| December 2009 | Section 2  New Section 10 | Additional information about the influence on measurement.  Introduction of colour collections. |
| May 2013 | Section 2.5  Section 8  Section 9 | Additional information about measurement devices  Some small correction in section 8  Updated references |
| ???? ???? | Removal of technical annex | Creation of IALA Guideline 1xxxx …………… |
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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**

1. The need to provide guidance within which the colours and colour boundaries of surface colours used as visual signals on aids to navigation should be determined.
2. That such guidance should enable a common approach to be made world-wide, thus greatly assisting mariners, who, while passing through waters of different authorities, should not be confused by surface colours that are ambiguous.

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

**ADOPTS** the tables and charts 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 the colour model used throughout all specifications is the chromaticity chart according to the CIE 1931 standard colorimetry system (2°-observer);
* that the standard illuminant for measurement is D65 (6500 K);
* that the measurement geometry is 45°/0°;
* that National Members, other appropriate Authorities and manufacturers providing marine aids to navigation services adopt the system for surface colours set out in the Annexes to this Recommendation.

1. Ordinary Colours
2. Specification of ordinary colours

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Colour | Boundary | Equation of the boundary limits | Luminance factor | |
| Minimum | Maximum |
| Red | Purple White Orange | *y* = 0.345 – 0.051 *x*  *y* = 0.910 – *x*  *y* = 0.314 + 0.047 *x* | 0.07 | - |
| Orange | Red White Yellow | y = 0.265 + 0.205 x y = 0.910 – x y = 0.207 + 0.390 x | 0.20 | - |
| Yellow | Orange White Green | *y* = 0.108 + 0.707 *x*  *y* = 0.910 – *x*  *y* = 1.35 *x* – 0.093 | 0.50 | - |
| Green | Yellow White Blue (Preferred) Blue (General) | *y* = 0.313  *y* = 0.243 + 0.670 *x*  *y* = 0.636 – 0.982 *x y* = 0.493 – 0.524 *x* | 0.10 | - |
| Blue | Green White Purple | *y* = 0.118 + 0.675 *x*  *y* = 0.700 – 2.30 *x*  *y* = 1.65 *x* – 0.187 | 0.07 | - |
| White | Purple Blue Green Yellow | *y* = 0.010 + *x*  *y* = 0.610 – *x*  *y* = 0.030 + *x*  *y* = 0.710 – *x* | 0.75 | - |
| Black | Purple Blue Green Yellow | *y* = *x* – 0.030  *y* = 0.570 – *x*  *y* = 0.050 + *x*  *y* = 0.740 – *x* | - | 0.03 |

(x, y) chromaticity coordinates of the corners of the recommended regions for ordinary colours specified in Table 1.

1. Corners of the chromaticity regions of ordinary colours

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | 1 | | 2 | | 3 | | 4 | |
| x | y | x | y | x | y | x | y |
| Red | 0.690 | 0.310 | 0.595 | 0.315 | 0.569 | 0.341 | 0.655 | 0.345 |
| Orange | 0.610 | 0.390 | 0.535 | 0.375 | 0.506 | 0.404 | 0.570 | 0.429 |
| Yellow | 0.522 | 0.477 | 0.470 | 0.440 | 0.427 | 0.483 | 0.465 | 0.534 |
| Green (Preferred) | 0.313 | 0.682 | 0.313 | 0.453 | 0.238 | 0.402 | 0.004 | 0.632 |
| Green (General) | 0.313 | 0.682 | 0.313 | 0.453 | 0.210 | 0.383 | 0.015 | 0.485 |
| Blue | 0.078 | 0.171 | 0.196 | 0.250 | 0.225 | 0.184 | 0.137 | 0.038 |
| White | 0.350 | 0.360 | 0.300 | 0.310 | 0.290 | 0.320 | 0.340 | 0.370 |
| Black | 0.385 | 0.355 | 0.300 | 0.270 | 0.260 | 0.310 | 0.345 | 0.395 |



1. Chromaticity regions for ordinary colours
2. Fluorescent Colours
3. Specification of fluorescent colours

|  |  |  |  |
| --- | --- | --- | --- |
| Colour | Boundary | Equation of the boundary limits | Minimum Luminance factor |
| Red | Purple White Orange | *y* = 0.345 – 0.051 *x*  *y* = 0.910 – *x*  *y* = 0.314 + 0.047 *x* | 0.25 |
| Orange | Red White Yellow | y = 0.265 + 0.205 x y = 0.910 – x y = 0.207 + 0.390 x | 0.40 |
| Yellow | Orange White Green | *y* = 0.108 + 0.707 *x*  *y* = 0.910 – *x*  *y* = 1.35 *x* – 0.093 | 0.60 |
| Green | Yellow White Blue (Preferred) Blue (General) | *y* = 0.313  *y* = 0.243 + 0.670 *x*  *y* = 0.636 – 0.982 *x y* = 0.493 – 0.524 *x* | 0.25 |

(x, y) chromaticity coordinates of the corners of the recommended regions for fluorescent colours specified in Table 3.

1. Corners of the chromaticity regions of fluorescent colours

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | 1 | | 2 | | 3 | | 4 | |
| x | y | x | y | x | y | x | y |
| Red | 0.690 | 0.310 | 0.595 | 0.315 | 0.569 | 0.341 | 0.655 | 0.345 |
| Orange | 0.610 | 0.390 | 0.535 | 0.375 | 0.506 | 0.404 | 0.570 | 0.429 |
| Yellow | 0.522 | 0.477 | 0.470 | 0.440 | 0.427 | 0.483 | 0.465 | 0.534 |
| Green (Preferred) | 0.313 | 0.682 | 0.313 | 0.453 | 0.238 | 0.402 | 0.004 | 0.632 |
| Green (General) | 0.313 | 0.682 | 0.313 | 0.453 | 0.210 | 0.383 | 0.015 | 0.485 |



1. Chromaticity regions for fluorescent colours