Input paper: [[1]](#footnote-1) ENG16-3.1.1.2

Input paper for the following Committee(s): check as appropriate Purpose of paper:

**□** ARM X ENG **□** PAP **🗹** Input

**□** ENAV **□** VTS **□** Information

Agenda item [[2]](#footnote-2) n.n

Technical Domain / Task Number 2 …Visual Signalling………………………………

Author(s) / Submitter(s) …Alwyn Williams, GRAD……………………

Standard Measurement Conditions for inclusion in Recommendation R0203

# Summary

ENG Working Group 1 (WG1) has been working on the revision of Recommendation R0203 on Terms of Measurement over the last several sessions of the committee meetings, as well as a small number of intersessional meetings. The purpose of the document is to standardise the definitions and terms that define the performance of marine AtoN lights. This has the potential to impact various aspect of marine lights, including measurement processes and their marketing.

Compared to other types of light sources, LEDs’ performance is more dependent on the conditions it is operating. Most notable is the variation with temperature, where the luminous output drops with junction temperature. The intention of this paper is to capture standard environmental conditions to ensure that light measurements involving LEDs (and other types of light sources) are comparable with each other.

## Related documents

* Draft IALA Recommendation R0203

# Discussion

The main reference for standard test conditions is CIE S 025/E:2015 (hereby referred to as S025), which is a CIE International Standard on “Test Method for LED Lamps, LED Luminaires and LED Modules”. The document provides a very comprehensive set of conditions, and means of quantifying uncertainty, related to the measurement of LEDs. It should be noted that some of the areas covered in the document may not apply to the marine AtoN lights (e.g. measurement of luminous flux). As such, it will be necessary to be selective about the conditions applicable to Recommendation R0203.

The intention is not to repeat the text from S025 here, since it is available to purchase and there are obvious copyright issues. Nevertheless, the following conditions have been identified that could be included in the recommendation, with further information provided in an accompanying guideline. For each condition, the relevant section in S025 is given should further information be required by the reader.

## Ambient Temperature

(S025, Section 4.2.2)

Ambient temperature is to be 25.0 °C with an acceptable interval of ± 1.2 °C. It is anticipated that most measurement facilities will be able to achieve this relatively easily.

However, if that is not possible, S025 recommends the use of a “service conversion factor” that corrects the results to account for the measurement not being made in the acceptable ambient temperature interval. The service conversion factor could be difficult, and expensive, to determine experimentally. One method that could be sufficiently accurate for this purpose is to obtain the performance variation chart from the LED manufacturer, and make the adjustment that way. An example of such a chart is shown in Figure 1 below.

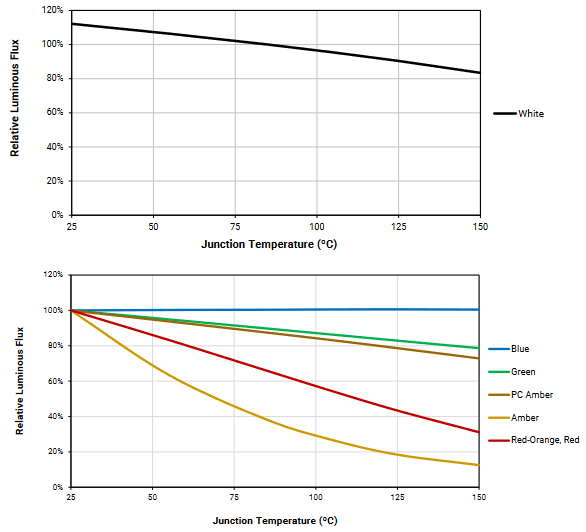


Figure - Example of LED relative flux variations with temperature, from Cree XP-E2 datasheet

In applying these charts, one will have to make the assumption that the change in luminous flux is linear of the range of interest and that the junction temperature varies directly with the ambient temperature. This might not be the case, especially since marine lights tend to flash. However, on average, a service conversion factor based on the datasheet may be sufficient.

## Air Movement

(S 025, Section 4.2.4)

The measurements are to be made in still air, with a tolerance interval of 0 m/s to 0.25 m/s.

## Test Voltage and Test Current

(S 025, Section 4.3.1)

The light under test should be supplied with the rated voltage at the power terminals, or in the case of individual LED devices, they should be supplied with the rated current. The tolerance interval shall be one of:

* ± 0.4 % for RMS AC voltage
* ± 0.2 % for DC voltage
* ± 0.2 % for DC current.

The applicable tolerance interval is dependent on the nature of the power required by the marine light.

## Other Conditions

The S025 document covers many aspects of measurement conditions, but the ones highlighted above should be considered as most important to be referred in the revised edition of Recommendation R0203.

S025 also covers conditions related to the instrumentation used in the measurements. It is recommended that this aspect should be covered in a guideline providing the practical advice on measuring light.

# Action requested of the Committee

The Committee is requested to take the suggestions above into account when finalising the revision of Recommendation R0203.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Leave open if uncertain [↑](#footnote-ref-2)