 Input paper: ENG1-9.4.5

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

**□** ARM **X** ENG **□** PAP **□** Input

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Agenda item 9.4

Technical Domain / Task Number TD#1

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Research of degradation characteristics of LED lanterns

with using time

The kind of inspections is a pre-service inspection, regular inspection and inspection for change with regard to the functioning of the equipment and supplies on navigational aids. Test on lantern is enforced optical characteristic test such as intensity of light(luminosity), chromaticity, horizontal/vertical divergence, light characteristics(flashing period), effective luminosity and electrical characteristic test such as daylight sensor, lamp changer, flasher test. Periodical inspection should be carried out on the AtoN equipment which are in service at regular interval every three years. Test of periodical inspection on lantern is enforced only optical characteristic test. Modification inspection should be tested before use when the functions of route guiding equipment are changed because of modification or repair.

This paper provides the information of research of degradation characteristics of LED lanterns with using time. We have examined LED Lanterns(4 colours : Red, Green, White, Yellow) during 3years. In consideration of the actual operating environment, the LED lanterns were installed on the buoy. We periodically measure the optical characteristics of lantern and reinstall.

*items of the optical characteristics test*

*- intensity of light(luminosity)*

*- chromaticity*

*- horizontal/vertical divergence*

*- light characteristics(flashing period)*

*- effective luminosity*



Fig. 1. The location of the Test

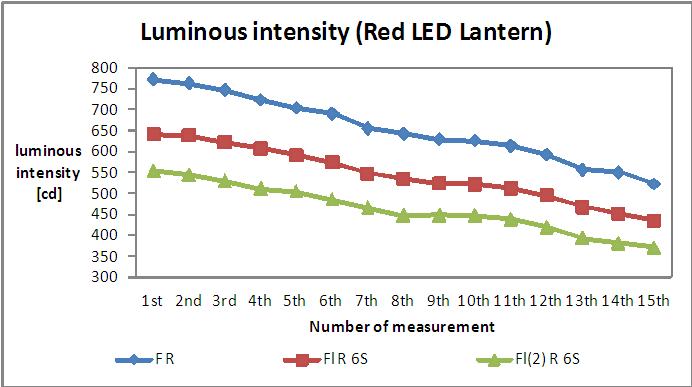
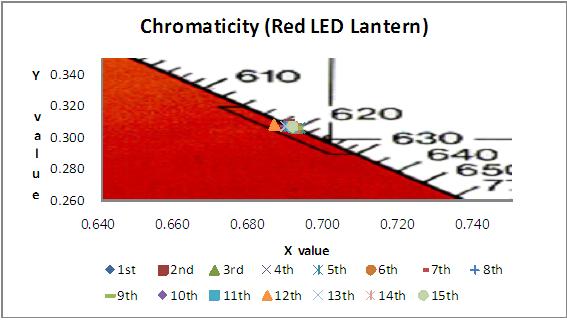
|  |  |
| --- | --- |
|  |  |
| A Buoy | B Buoy |
|  |  |
| C Buoy | D Buoy |
|  |  |
| E Buoy | F Buoy |

Fig. 2. The photograph of the actual operating tests

* Analysis of Optical Characteristics Red LED lantern

Chromaticity of a Red LED Lantern is satisfied with Chromaticity standards, and a change of light color as a function of using time was almost no change.

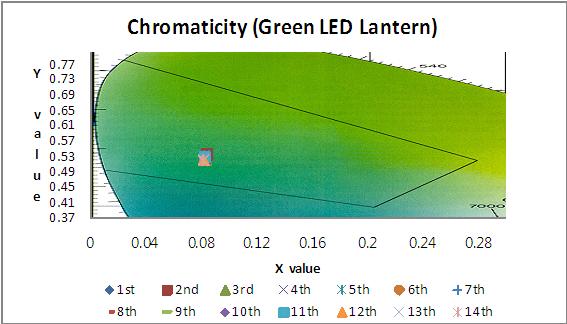
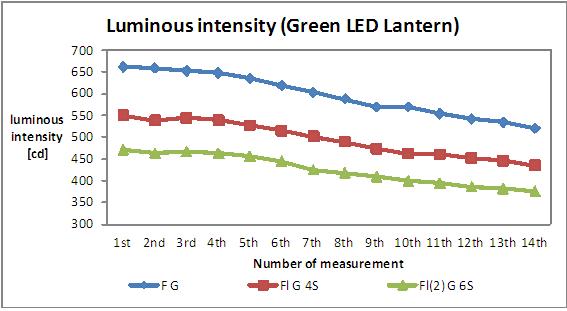
The luminous intensity of it was gradually decreased until 3 years after installation. Three years later, the decrease in the luminous intensity was about 32% compared to the initial luminous intensity and was satisfied with the regular inspection standards.



* Analysis of Optical Characteristics Green LED lantern

Chromaticity of a Green LED Lantern is satisfied with Chromaticity standards, and a change of light color as a function of using time was almost no change.

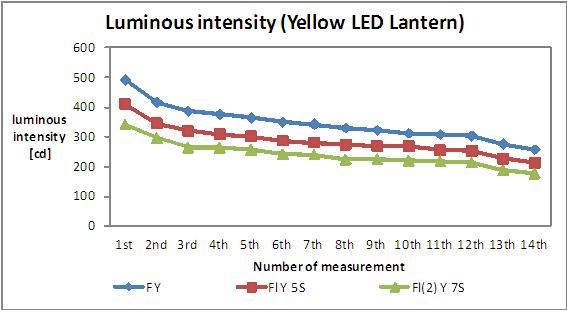
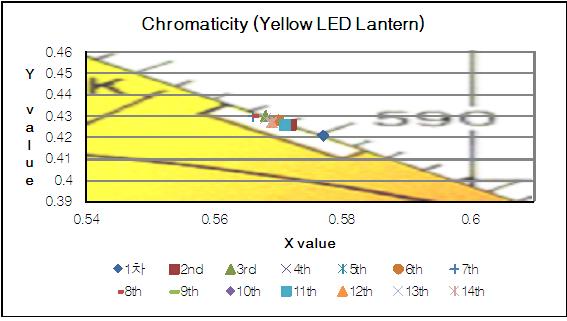
The luminous intensity of it was almost no change until 8 months after installation and was gradually decreased after 8 months. Three years later, the decrease in the luminous intensity was about 21% compared to the initial luminous intensity and was satisfied with the regular inspection standards.

* Analysis of Optical Characteristics Yellow LED lantern

Chromaticity of a Yellow LED Lantern is satisfied with Chromaticity standards, but a change of light color as a function of using time appears.

The luminous intensity of it was rapidly decreased until 4 months after installation. The luminous intensity after 33 months showed a reduction of about 44% from the initial luminous intensity and did not meet the regular inspection standards. Three years later, the decrease in the luminous intensity was about 47% compared to the initial luminous intensity.



* Analysis of Optical Characteristics White LED lantern

Chromaticity of a White LED Lantern is satisfied with Chromaticity standards, but a change of light color as a function of using time appears.

The luminous intensity of it was gradually decreased until 6 months after installation. The luminous intensity after 21 months showed a reduction of about 50% from the initial luminous intensity and did not meet the regular inspection standards. Three years later, the decrease in the luminous intensity was about 79% compared to the initial luminous intensity.

