Input paper: [[1]](#footnote-1) ENG6-10.34 v2

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Workplan Task Number / Technical Domain 2 2.1.1/TD#2

Working Group WG2

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Sea Test Results of Plastic Buoys (PE, PU, Steel)

Related Guideline: IALA Guideline 1006('13.12)

# Test SUMMARY

In order to analyze the advantages and disadvantages of the plastic (PE, PU) and steel buoys, and derive improvement, Ministry of Oceans and Fisheries (PYEONGTAEK Regional Office of Oceans and Fisheries) and KAAN have been jointly test.

- Installed 5 units (plastic 4, steel 1) in the sea area nearby Pyeongtaek Port

- Test period/ Test Samples: Feb. 2016. ~ Feb. 2018 / 5 (Polyethylene 3, Polyurea foam 1, Steel 1)

Table 1 Specification of test buoys

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Body** | **diameter(㎜)** | **height(㎜)** | **draft(㎜)** | **weight(kg)** | **color** | **install date** | **quantity** |
| PE(JET-7000) | 2,600 | 8,789 | 2,996 | 2,085 | R | ‘16.2.19 | 2 |
| PE(PB-26) | 2,600 | 10,513 | 4,469 | 3,539 | R | ‘16.2.19 | 1 |
| Poly Urea Foam | 2,800 | 6,900 | 4,600 | 4,923 | WB | ‘16.3.18 | 1 |
| Steel(LL-26(M)) | 2,600 | 9,400 | 4,100 | 5,982 | R | ‘16.2.19 | 1 |



Figure Photograph of Sea Test (installed buoys)

## Light buoy stability

In order to analyze stability of the light buoys, two-axis tilt angle meters (X, Y-axis measurement of the dynamic angle of tilt in two directions) were installed in the upper steel tower of the light buoys.The daily maximum tilt angles of BangdoTest A (JET-7000), BangdoTest D (PB-26) and BangdoTest E (LL-26M) were respectively measured at 38.6 °, 38.5 ° and 38.8 °.

The daily maximum tilt angle of the BangdoTest A (JET-7000), BangdoTest E (LL-26M) is significantly changing the slope, but BangdoTest D (PB-26) is gradually changed.

The cause for the maximum inclination angle of the measuring buoy is unknown. It is necessary to check the stability analysis of the maximum inclination angle from the data measured for about two years.

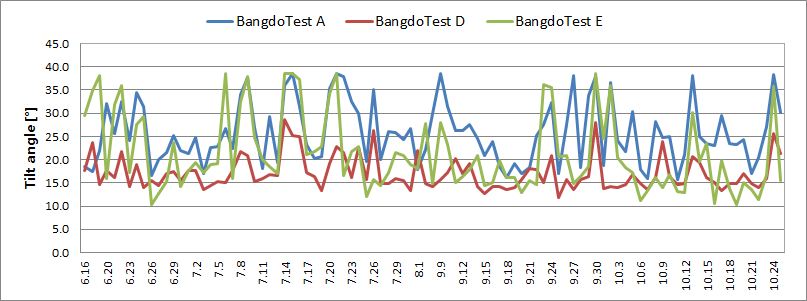


Figure 2 Graph of Daily Maximum Tilt angle

## Chromaticity change of Surface colour

Although the surface colour of the test light buoys is changed with time, it meets the criteria.

   \* Portable Spectrophotometer (CM-2600d, KONICA MINOLTA) used only flat color change over time for inspection

|  |  |
| --- | --- |
| EMB0000bcf81a1c | EMB0000bcf81a1d |
| BangdoTest A (JET-7000) | BangdoTest C (Polyurea foam) |
| EMB0000bcf81a1e | EMB0000bcf81a1f |
| BangdoTest D (PB-26) | BangdoTest E (LL-26M) |
| \* Measurement date: First (16.3.18), Second (16.5.25), Third (16.6.17), Forth (16.9.8), Fifth (16.11.14) | |

Figure 3 Result of measuring Surface colour

## Attachment state of sea algae and shellfish

In the inspection (after 4 months of installation), there is a difference in the attachment of marine organisms depending on whether the antifouling paint is painted.

In the inspection (after 9 months of installation), marine organisms adhered regardless of the antifouling paint (there is a difference in the degree of adhesion).

|  |  |
| --- | --- |
| EMB0000bcf819b8 | EMB0000bcf81a20 |
| 1. After 4 months | 1. After 9 months |
| BangdoTest A (JET-7000) | |
| EMB0000bcf819f9 | EMB0000bcf819fa |
| 1. After 4 months | 1. After 9 months |
| BangdoTest C (Polyurea Foam) | |
| EMB0000bcf819fb | EMB0000bcf819fc |
| 1. After 4 months | 1. After 9 months |
| BangdoTest D (PB-26) | |
| EMB0000bcf819fd | EMB0000bcf819fe |
| 1. After 4 months | 1. After 9 months |
| BangdoTest E (LL-26M) | |

Figure 4 Comparison of attachment state of marine organisms

## Results

In the case of Plastic buoys, generally marine organisms attached to the bottom of plastic buoy body severly. However, the degree of marine organism adherence on the tail pipe was rather low, and it is possible to remove marine organism manually because of characteristic of plastic.

In the case of a Steel buoy, the degree of marine organism adherence on the body and tail pipe were generally low, and the distribution of marine organisms on the steel pipe among the four buoys were the lowest.

It is expected to conduct on-site survey on plastic and steel buoys until February 2018, and analyze and submit the results. Continued discussions are also required at the next session (2018 ~ 2022) on the Plastic buoys.

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