Ultra low Friction Anti-fouling

SEAFLO NEO Z Series

SEAFLO neo Z

SEAFLO neo SL Z

FIR theory is our indicator which is established by collaborating with Tokyo University of Science, Tokyo University of Agriculture and Technology and National Maritime Research Institute, that can be verified the fuel saving rate.

FIR can be estimated from the roughness (Rz) & wavelength (RSm) of the surface, through the above mathematic formula.

\[ \text{FIR(\%)} = 2.62 \times \frac{Rz^2}{RSm} \]

It is known that the frictional resistance is about 60-80% of the total hull resistance that greatly affects the vessels' fuel consumption. SEAFLO NEO Z series contributes to give a remarkable fuel saving with the ultra smooth surface technology.

1 2 3 4 5 6 7 8 9 10

Current AF

FIR : 10.7%

Fuel Savings

\[ \text{FIR(\%)} \]

* With current AC

5 8

* Compared with current products

* With low friction AC

SEAFLO NEO SL Z

FIR : 1.5%

SEAFLO NEO Z

FIR : 1.2%

HEADQUARTERS

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"SEAFLO NEO Z" & "SEAFLO NEO SL Z" provide "Triple Synergy Technology" providing an ultra-smooth surface which gives a long-term sustainability of ultra low FIR.

* when combined with BANNOH Z series (CMP's latest ultra smooth anticorrosive the best results are achieved)

SEAFLO NEO Z utilises innovative hydrolysis polymer, contributing to fuel saving, forming a smooth surface which has extremely low friction resistance. In addition, the lowest VOC level in the industry has been achieved as an eco-friendly, anti-fouling paint.

SEAFLO NEO SL Z* realizes ultra-smooth paint film surface and an excellent hydrolysis anti-fouling property as it is designed using advanced silyl and unique pigmentation technology.

* SEAFLO NEO SL Z is highly advanced silyl product.
**3 innovative technology for Ultra Smooth Surface**

**Triple Synergy Technology**

- **Ultra low FIR AF**
  - Current AC + Current AF
  - Rz: 111μm  RSm: 3024μm
  - FIR: 10.7%

- **Ultra low FIR AC**
  - Current AC
  - Rz: 119μm  RSm: 2470μm
  - FIR: 15.0%

- **Sustainable ultra low FIR**
  - FIR (%) estimation (by Ageing simulation test)
  - Current AF
  - SEAFLO NEO Z Series

**After application**

- Container Carrier
- Bulk Carrier
- VLCC
- LNGC

**Ultra low FIR AF**

**Ultra low FIR AC**

**Long term continuation of ultra low FIR**

**Ageing simulation test**

**Innovative fuel saving technology**
SEAFLO NEO Z Series Current anti-fouling coating

**Performance**

- LNGC / 25 Months
- Bulk Carrier / 30 months
- High Speed Ferry / 10 months

### Application

**SEAFLO NEO SL Z**
- VLCC
- Gas Carrier
- Container Carrier
- PCC

**SEAFLO NEO Z (SEAFLO NEO SL Z)**
- Product Carrier
- Chemical Carrier
- Bulk Carrier
- General Cargo

### Result from SEAFLO NEO

<table>
<thead>
<tr>
<th></th>
<th>drop rate of high power</th>
<th>type of vessels</th>
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<tbody>
<tr>
<td>sea trial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ship yard 1</td>
<td>4.0%</td>
<td>Bulk Carrier</td>
</tr>
<tr>
<td>ship yard 2</td>
<td>0.5 ~ 3.5%</td>
<td>PCC</td>
</tr>
<tr>
<td>ship yard 3</td>
<td>3.5%</td>
<td>Bulk Carrier</td>
</tr>
<tr>
<td>ship yard 4</td>
<td>2.0 ~ 2.8%</td>
<td>Bulk Carrier</td>
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<tr>
<td>in-service ship</td>
<td></td>
<td></td>
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<tr>
<td>ship owner A</td>
<td>17.1%</td>
<td>PCC</td>
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<tr>
<td>ship owner B</td>
<td>14.3%</td>
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<tr>
<td>ship owner C</td>
<td>4.4%</td>
<td>RORO</td>
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<td>ship owner D</td>
<td>5.0%</td>
<td>Container</td>
</tr>
<tr>
<td>ship owner E</td>
<td>3.0%</td>
<td>Bulk Carrier</td>
</tr>
</tbody>
</table>

* The data derives from SEAFLO NEO and SEAFLO NEO SL.

### Rheology control

- **Paint Application**
  - Film surface
  - Solvent

- **Current anti-fouling coating**
  - **SEAFLO NEO Z Series**

### Combination

**Excellent balance of pigments and the polymer**

The excellent balance of pigments, polymer and the technique of dispersion results in proper release of biocides

### Unique spray characteristics

- High solid / Less Solvent
- Less dust/overspray
- Attainment of smoothness of the applied film
- Less impact on humans and the environment
It is known that the frictional resistance is about 60-80% of the total hull resistance that greatly affects the vessels' fuel consumption. SEAFLO NEO Z series contributes to give a remarkable fuel saving with the ultra-smooth surface technology.

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FIR can be estimated from the roughness (Rz) & wavelength (RSm) of the surface, through the above mathematical formula.

\[
FIR(\%) = \frac{2.62 \times Rz^2}{RSm}
\]

**Double Cylinder Friction Resistance Equipment**

**Surface roughness and turbulent flow**

*Compared with current products*
Ultra low Friction Anti-fouling

"Fuel Saving, Low VOC and Carbon Reduction"

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FIR can be estimated from the roughness ($R_z$) & wavelength ($R_{Sm}$) of the surface, through the above mathematic formula.

\[
FIR(\%) = 2.62 \times R_z^2 \div R_{Sm}
\]

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Current AF

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FIR (%)

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