

Environmentally Acceptable Stern Tube Oil

MILLUBE™ ST-100U

1. Description

MILLUBE™ ST-100U is stern tube oil which has many great functions such as, excellent lubricity / excellent rust prevention. And it is Environmentally Acceptable Lubricant (EAL) according to the definitions and requirements of the US EPA 2013 Vessel General Permit (VGP).

2. Feature

✓ High Safety

Meets the 2013 VGP requirements of 'biodegradability', 'toxicity' and 'bioaccumulation'.

✓ Excellent Lubricity and Excellent Rust Prevention

Shows excellent lubricity even at the starting of operation, when troubles such as bearing damage are likely to occur.

Shows excellent rust prevention even in the severe rust prevention test using natural sea water.

✓ Good Seal Compatibility

Passed the 'seal compatibility test' of Kemel and Wärtsilä.

✓ Environmental Technology Award

Received the 21st "Environmental Technology Award" from the Kinki Chemical Association in 2020.

3. Typical Characteristics

Test items		Test method	MILLUBE™ ST-100U
Appearance(25℃)		—	Clear liquid
Density (15℃, g/cm ³)		ASTM D 1298	0.945
Color (ASTM)		ASTM D 1500	L2.5
Flash Point(℃)		ASTM D 92	342
Acid value (mgKOH/g)		ASTM D 974	0.93
Kinetic Viscosity (mm ² /s)	40℃	ASTM D 445	123.4
	100℃		18.45
Viscosity Index		ASTM D 2270	168
Pour Point (℃)		ASTM D 97	-35
Foaming test (ml)		ASTM D 892	0/0
Water Separability 82℃ (ml-ml-ml (min))		ASTM D 1401	40-38-2 (40)
Rust Prevention	Distilled water	JIS K 2510	Pass
	Sea water		Pass
Thermal stability		JIS K 2540	Pass
Wear resistance (μm)		ASTM D 4172	300
Extreme Pressure (kgf) (Fail load)		ASTM D 2783	160



Appearance
(25℃)

The above figures are typical of those obtained with normal production tolerance and do not constitute a specification.

<Packages> 200L Drum / 20L Pail / 18L Can

<Analysis> ①Water content, ②Metal contents, ③Acid Number of oil, etc.
The above analysis is carried out by our affiliated analysis company.

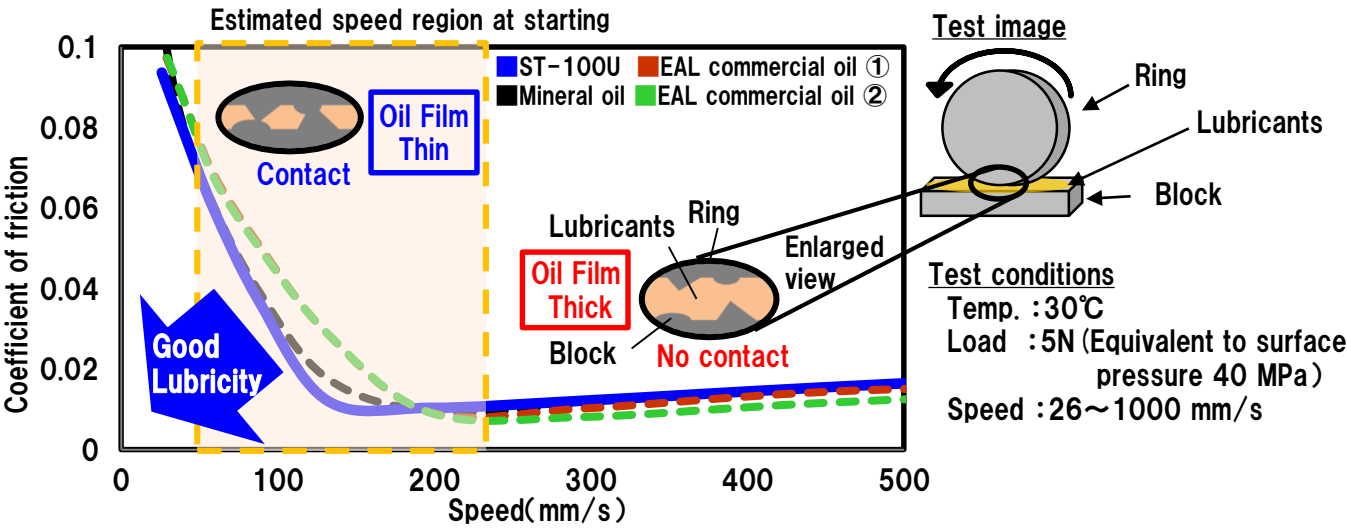
4. Result

<Safety>

Test items		Test method	Requirement	MILLUBE™ ST-100U
Biodegradability (%)		OECD 301C	>60	>60
Toxicity (EC50,LC50) (mg/L)	Algae	OECD 201	>100	>100
	Daphnia	OECD 202	>100	>100
	Fish	OECD 203	>100	>100
Bioaccumulation (log KOW)		OECD 117	<3 or >7	Pass

This data is the result of evaluating MILLUBE™ ST-100U or its components.

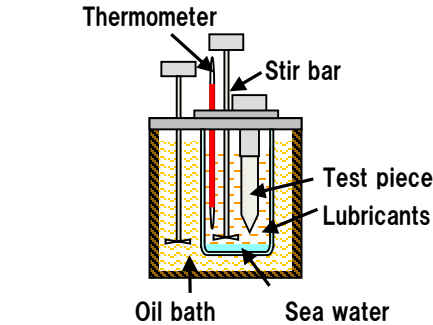
<Lubricity>



Shows excellent lubricity even at the beginning of operation, when troubles such as bearing damage are likely to occur.

<Rust Prevention>

ST-100U	Mineral oil	EAL commercial oil	
		①	②
30 days later	30 days later	7 days later	5 days later
Not rusted	Not rusted	Rusted	Rusted
			



Test conditions

Temp.: 60°C,
Lubricants/Natural sea water=95/5 (wt%)

MILLUBE is a registered trademark in Japan, China and South Korea, and a trademark in other countries of NOF CORPORATION.



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