

## BIODEGRADABLE OIL (EAL) FOR STERNTUBE SEALS <FOR SEAL TYPE AX, CX, DX>

BASE OIL	OIL MAKER	OIL BRAND	SEAL RING MATERIAL	
			FKM for ESTER BIO	FPM / FKM for PAG BIO
PAG	KEMEL (EAGLE INDUSTRY)	BIO ST-100 (ST-83A)	-	A+
		BIO ST-120	-	A+
	SHELL	SHELL BIODEGRADABLE HYDRAULIC FLUID 68	-	A
		SHELL OMALA S3 W 100	-	A
ESTER BASE & OTHERS	BASF	ECOPRO HE 501-68	B	-
		ECOPRO HE 501-100	B	-
	BP/CASTROL	BIOBAR 68	A	-
		BIOBAR 100	A	-
		BIOSTAT 68	B	-
		BIOSTAT 100	B	-
		BIOSTAT 150	B	-
		BIOSTAT ST 100	A	-
		BIOSTAT ST 150	A	-
		BIOTRANS GB 68	B	-
		BIOTRANS GB 100	B	-
	BIOTRANS GB 150	B	-	
	CHEVRON	CLARITY SYNTHETIC EA HYDRAULIC OIL 68	B	-
		CLARITY SYNTHETIC EA HYDRAULIC OIL 100	B	-
		Clarity Bio EliteSyn AW 68	B	-
		Clarity Bio EliteSyn AW 100	B	-
		Clarity Bio EliteSyn AW 150	B	-
	COSMO OIL	COSMO TERRA STERN TUBE 100	B	-
	Calumet Branded Products	BIOMAX STERN TUBE EAL 100	B	-
		BIOMAX STERN TUBE EAL 150	B	-
	EXXON MOBIL	MOBIL SHC AWARE ST 100	A	-
		MOBIL SHC AWARE GEAR 150	B	-
	GULF OIL MARINE	GULFSEA BD STERNTUBE OIL 68	B	-
		GULFSEA BD STERNTUBE OIL 100	A	-
		GULFSEA BD STERNTUBE OIL 150	A	-
	KOREA HOUGHTON	TECTYL BIO OS 100	B	-
	KLUBER	BIO RM 2-100	A	-
		BIO RM 2-150	B	-
		BIO EG 2-68	B	-
		BIO EG 2-100	B	-
		BIO EG 2-150	B	-
		BIO RB 2-100	B	-
BIO RM 8-100		B	-	
KAJO	KAJO-BIO-Sterntube Oil 100	B	-	

**BIODEGRADABLE OIL (EAL) FOR STERNTUBE SEALS  
<FOR SEAL TYPE AX, CX, DX>**

BASE OIL	OIL MAKER	OIL BRAND	SEAL RING MATERIAL	
			FKM for ESTER BIO	FEPM / FKM for PAG BIO
ESTER BASE & OTHERS	LENOL (FUCHS)	PLANTOGEAR 100 S	A	-
		PLANTOGEAR 150 S	A	-
		PLANTOSYN 68 HVI	B	-
	NOF CORPORATION	MILLUBE ST-100S	B	-
		MILLUBE ST-100U	A	-
		MILLUBE ST-150U	A	-
	PANOLIN	STELLA MARIS 68	A	-
		STELLA MARIS 100	A	-
		STELLA MARIS 150	B	-
		HLP SYNTH 68	B	-
		HLP SYNTH 100	B	-
		STELLA MARIS NRT 68	B	-
		STELLA MARIS NRT 100	B	-
	RSC BIO SOLUTIONS	ENVIROLOGIC HF 68 HP	B	-
		ENVIROLOGIC HF 100 HP	B	-
		ENVIROLOGIC GO 150	B	-
		FUTERRA HF 68	B	-
		FUTERRA HF 100	B	-
	SHELL	NATURELLE S4 STERN TUBE FLUID 100	A	-
		NATURELLE S4 GEAR FLUID 100	B	-
		NATURELLE S4 GEAR FLUID 150	B	-
		SHELL STERN TUBE LUBRICANT 100	B	-
		SHELL STERN TUBE LUBRICANT 150	B	-
		SHELL ECOSAFE EAL 68	B	-
		Shell PANOLIN S4 Stern Tube EAL 100	A	-
	SINOPEC	EA STERNTUBE OIL 68	B	-
		EA STERNTUBE OIL 100	B	-
	SK LUBRICANTS	SK BIO ST	B	-
		SK BIO ST 150	B	-
	Total Energies Lubmarine	BIONEPTAN 100	C	-
		BIONEPTAN HT 100	A	-
	VICKERS	HYDROX BIO 68	B	-
		HYDROX BIO 100	A	-
		HYDROX BIO 150	A	-
		BIOGEAR XP 68	B	-
		BIOGEAR XP 100	B	-
		BIOGEAR XP 150	B	-
		ECOSTERN SMX 100	B	-
		ECOSURE EAF 68	B	-
		ECOSURE EAF 100	B	-

- A : Good (A+ :greater than A)
- B : Fair / Size limitation or application limit. Consult KEMEL for details.
- C : Passing / Temperature limit & application limit. Consult KEMEL for details.

#### Remarks

1. For FWD seal, it is strongly recommended to use the highly compatible oils of rank A.
2. For AFT seal, it is strongly recommended to apply oil line to chamber between seal rings #2 and #3.
3. Other than the compatibility, all properties and characteristics of the each oil; including effects of dew, water or seawater inclusion, heat, mixture with residues of other oil grades replaced or used for shaft work & flushing, paint, dirt or water in tanks & pipes in initial oil filling, oil maintenance and storage etc. are out of KEMEL's scope. For proper operation of stern tube system, obtain information / instruction on these particulars from each oil makers.
4. Oils are listed as "Biodegradable" according to oil maker's information. Confirm with the oil maker if the oil meets EAL requirements by the US rule VGP 2013.
5. Follow ship builder's recommendation of oil viscosity if it is specified for stern tube bearing lubrication.
6. Oil list will be revised without notice.