Understanding EALs

A primer for small vessel operators

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The use of environmentally acceptable lubricants (EALs) in all oil-to-sea interfaces of vessels greater than 79 feet in length has been mandated by the United States Environmental Protection Agency since December 2013. While operators of larger vessels have become familiar with what is required from them, there is still a great deal of uncertainty around why these fluids have been mandated, how they perform and what benefits they deliver. The pending Small Vessel General Permit (sVGP) has created even more market confusion, especially among smaller vessel operators, who may be less familiar with these fluids and their use.

About sVGP

The sVGP will apply to non-military, commercial vessels that are less than 79 feet in length. Compliance with the sVGP allows vessels to meet the Clean Water Act (CWA) requirement to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges incidental to normal operations. The discharges covered in the sVGP are categorized into several broad categories, which are listed in the permit, and include: common-sense requirements for general discharges, fuel management, engine and oil control, solid and liquid waste management, deck wash down and runoff and above water line hull cleaning, vessel hull maintenance, graywater, fish hold effluent, ballast water and overboard cooling water discharges.

While the Federal moratorium on sVGP requirements was recently extended from December 2014 to December 2017, the marine industry is clearly moving in the direction of enhanced sustainability, and all operators, regardless of the size of their vessels, must be educated on these regulations and whether the products they use are as environmentally-friendly as possible.

What is an EAL?

Environmentally Acceptable Lubricants are defined by the EPA as offering these three characteristics.

– **First, they must be "biodegradable"** - biodegrading into carbon dioxide and water by ≥ 60% or more within 28 days (according to OECD 301B or ASTM D7373 methods).

– **Second, they must be "minimally toxic,"** causing only a light impact on the aquatic environment (LC50> 100mg/L for lubricants and LC50>1000mg/L).

– **Third, they are "not bioaccumulative,"** and must have a low propensity to bioaccumulate in organisms.

Additionally, the Clean Water Act of 1972 mentions discharges of oils should not exhibit any visible 'sheen' on the water's surface otherwise it is considered a pollutant (according to CFR 40 Part 435 A).

Where to Use EALs

EALs should be used in place of traditional petroleum lubricants in all marine applications where there is any oil-to-water interface. These applications include stern tubes, controllable pitch propellers, stabilizers, rudders, thrusters, Azipods, towing, notch interfaces, wire rope and mechanical equipment subject to immersion such as dredges and grabs.

EAL Confusion in the Marketplace

There's conflicting information in the marketing place about EALs. A lack of agreed upon definition is one contributing factor, as is lack of awareness of the four different types of EALs that are available. Inconsistent performance claims from manufacturers have also led to the confusion. Let's clarify a few myths right from the start:

EALs Do

- Perform equal to or better than petroleum lubricants
- Mitigate the discharge's environmental impact
- Improve productivity, which leads to profitability

EALs Don't

- Eliminate spill occurrence
- Eliminate the need to report a spill or discharge
- Eliminate the need to clean up a spill or discharge

The Benefits of EALs

Another common misconception is that EALs, while being good for the environment, are not the best choice for operators. However, EALs also deliver a wide range of benefits, making them a strong choice even for those who not are not currently required to use them.

– Sustainability Benefits

While EALs are generally more expensive than conventional oil counterparts in upfront costs, an increasing number of companies have chosen to convert to EALs based on their broad range of environmental and performance benefits. In various marine applications and equipment, there are periodic fluid leaks and discharges. It is critical to minimize any environmental damage or detrimental contact to humans, aquatic life or animals that can be caused by these unavoidable leaks and discharges. Using biodegradable EALs allows companies to be confident that their leaks and discharges will not cause harm to water, land or living beings while potentially reducing remediation costs or fines.

Features	Petroleum	HETG	HEPG	HEES	HEPR
Durability / Life Expectancy	●	●	●	●	●
Viscosity Index	●	●	●	●	●
Oxidative Stability	●	●	●	●	●
Hydrolytic Stability	●	●	●	●	●
Seal Compatibility	●	●	●	●	●
Frictional Characteristics	●	●	●	●	●
Mineral Oil Compatibility	●	●	●	●	●
Biodegradability	●	●	●	●	●
Ecotoxicity	●	●	●	●	●
Bioaccumulation Potential	●	●	●	●	●

– Performance Benefits

In addition to risk mitigation, sustainability and compliance benefits, EALs, which are high viscosity (high VI) lubricants, can offer several performance advantages including:

- Durability and extended wear protection
- Extended fluid life
- Broad temperature range performance
- Excellent thermal and hydrolytic stability
- Excellent seal compatibility
- Excellent water separation characteristics
- Good corrosion protection and oxidation stability

All of these factors combine to reduce total cost of ownership, which make select EALs a more attractive option for many organizations.

Choosing the Right EAL for Your Needs: The Four EAL Types

EPA recognizes four types of EALs:

- Vegetable Oils (HETG)
- Synthetic Esters (HEES)
- Polyalkylene Glycols (HEPG)
- Polyalphaolefins (PAOs) and related hydrocarbon products

Choosing the most suitable EAL depends on the end-user application. The chart below provides a quick side-by-side glance comparing features for all four EAL types and standard petroleum based lubricants. Reference corresponding color key. (See chart on the previous page.)

EAL compliance with VGP must be demonstrated through independent laboratory testing of the biodegradability, toxicity and bioaccumulation of fluid – often referred to as self-certification.

VGP regulations were not designed to interfere with your operations, but to help protect the marine environment on which your operations depend. Environmentally Acceptable Lubricants are not only mandated by the EPA, they perform equivalent to or better than petroleum lubricants while offering a safer alternative for employees to handle and have less impact on the environment.

While many factors should be considered when evaluating which EAL best fits your needs – including operating temperature and pressure, seals/elastomers, water ingress, fluid life, preventative maintenance cycles and spill/discharge potential – the U.S Environmental Protection Agency and many fluid manufacturers offer resources to help with conversion. By availing yourself of these resources, following expert advice and equipping crew members with the right information, operators can focus on what's most important: running a profitable business with compliant vessels that help protect and sustain our waterways.

The Author

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