



LE PRODUCTS
 MANUFACTURED
 UNDER AN ISO
 9001:2000
 CERTIFIED QUALITY
 SYSTEM

DUOLEC™

LE's Exclusive Dual Action Additive That Provides Elasto-Hydro-Dynamic (EHD) Antiwear (AW) Film Strength Enhancement & Boundary Lubrication Extreme Pressure (EP) Surface Protection

DUOLEC™ is the newest LE proprietary additive incorporating revolutionary technology designed specifically for use in LE gear lubricants. It is a temperature activated, dual acting, liquid additive that imparts special properties and synergies to the LE Products in which it is used. DUOLEC™ increases lubricant film strength and protects metal surfaces outperforming at greater temperatures and loads.

How DUOLEC™ Works

Under normal to light conditions of speed and load, two metal surfaces are effectively separated by a lubricant film. This is known as hydrodynamic lubrication. An increase in load or a decrease in speed reduces the lubricant film allowing metal to metal contact and raising the temperature of the contact zone due to frictional heat. As a result, the lubricant loses viscosity which decreases the film forming ability of the lubricant and its ability to minimize metal to metal contact. Under these more harsh conditions, the nature of lubrication changes from hydrodynamic to elasto-hydro-dynamic to mixed film to boundary, or thin film, lubrication. The revolutionary technology in DUOLEC™ offers protection under elasto-hydro-dynamic, mixed film and boundary conditions.

DUOLEC™ incorporates revolutionary new technology which is thermally activated to provide a dual layer of antiwear and extreme pressure protection that forms a solid-like protective layer on the metal surface. This layer fills surface asperities, effectively smoothing the surface and minimizing the effects of any metal to metal contact thereby reducing friction and preventing welding and surface wear. DUOLEC™ also greatly enhances the film strength of the oil to prevent rupture of the oil film, and thus minimize asperity contact and prolong the time before asperity contact occurs. The technology in DUOLEC™ is designed to be thermally activated in stages. When the loads are increasing, the



EHD and mixed film antiwear components of DUOLEC™ kick in. After loads become even greater, then the boundary lubrication extreme pressure performance of DUOLEC™ is activated.

When incorporated into gear oils bearing the DUOLEC™ name, the DUOLEC™ additive reacts quickly with the changing conditions to provide the special properties and synergies to the gear oils. The wear prevention and friction reduction capabilities of DUOLEC™ can be seen in the test results on the next page. In a wear test according to ASTM protocol, DUOLEC™ was found to reduce wear as much as 11% when it was the only additive incorporated into base oil. This shows the effect of DUOLEC™ without interference or enhancement by any other additives. Further testing for the friction reduction capabilities of DUOLEC™ was conducted using the SRV friction test machine. This testing resulted in a 25% reduction in friction over the base oil when DUOLEC™ was incorporated. These two tests are examples of the high level of performance that is delivered by DUOLEC™. DUOLEC™ containing lubricant products show even greater extreme pressure, wear prevention and friction reduction.

Value of DUOLEC™ to LE Lubricants

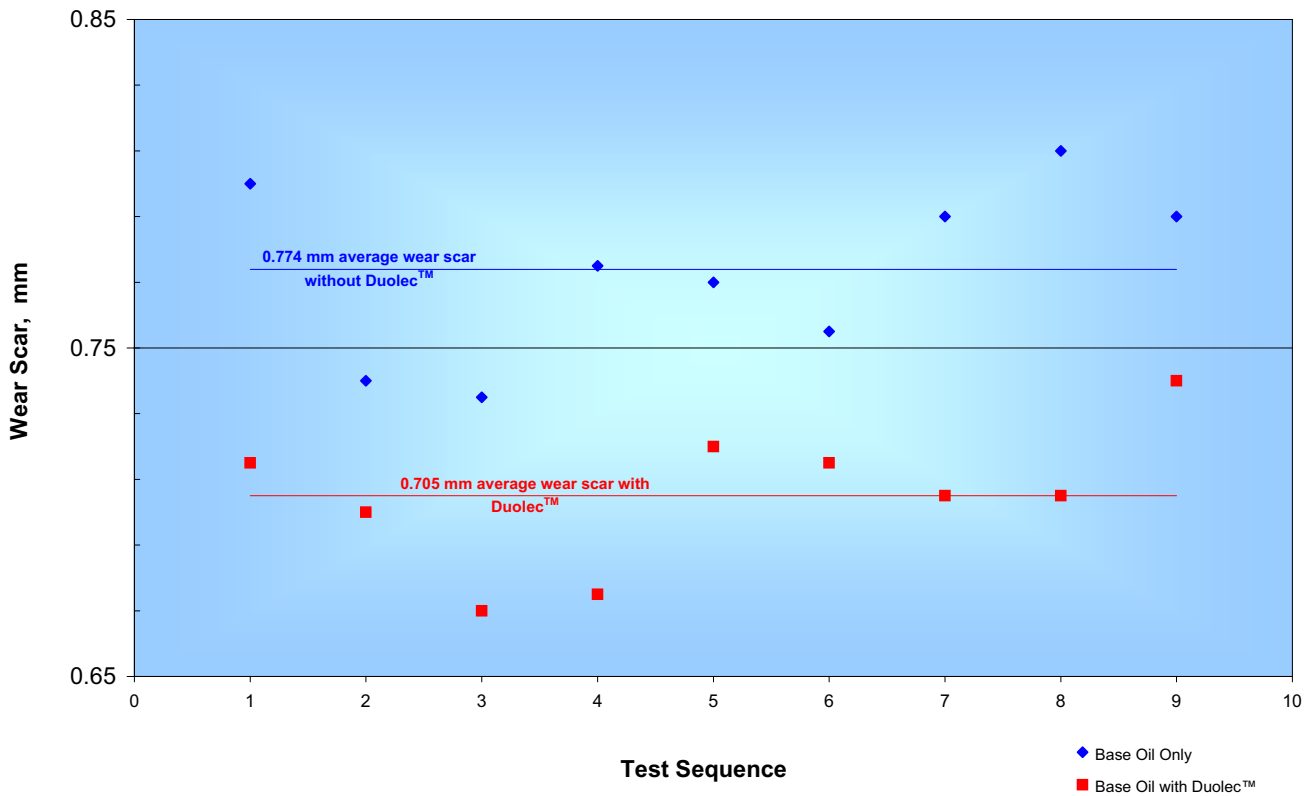
- ⊞ DUOLEC™ acts synergistically to improve performance qualities of other components in the lubricants.
- ⊞ DUOLEC™ reduces wear by reducing friction, improving oil film strength and providing surface protection when extreme pressures cause metal to metal contact.
- ⊞ DUOLEC™ is a liquid additive which does not build up or fall out of solution.
- ⊞ DUOLEC™ is designed especially for use in gear lubricants and under the conditions and loads typical to gear service.

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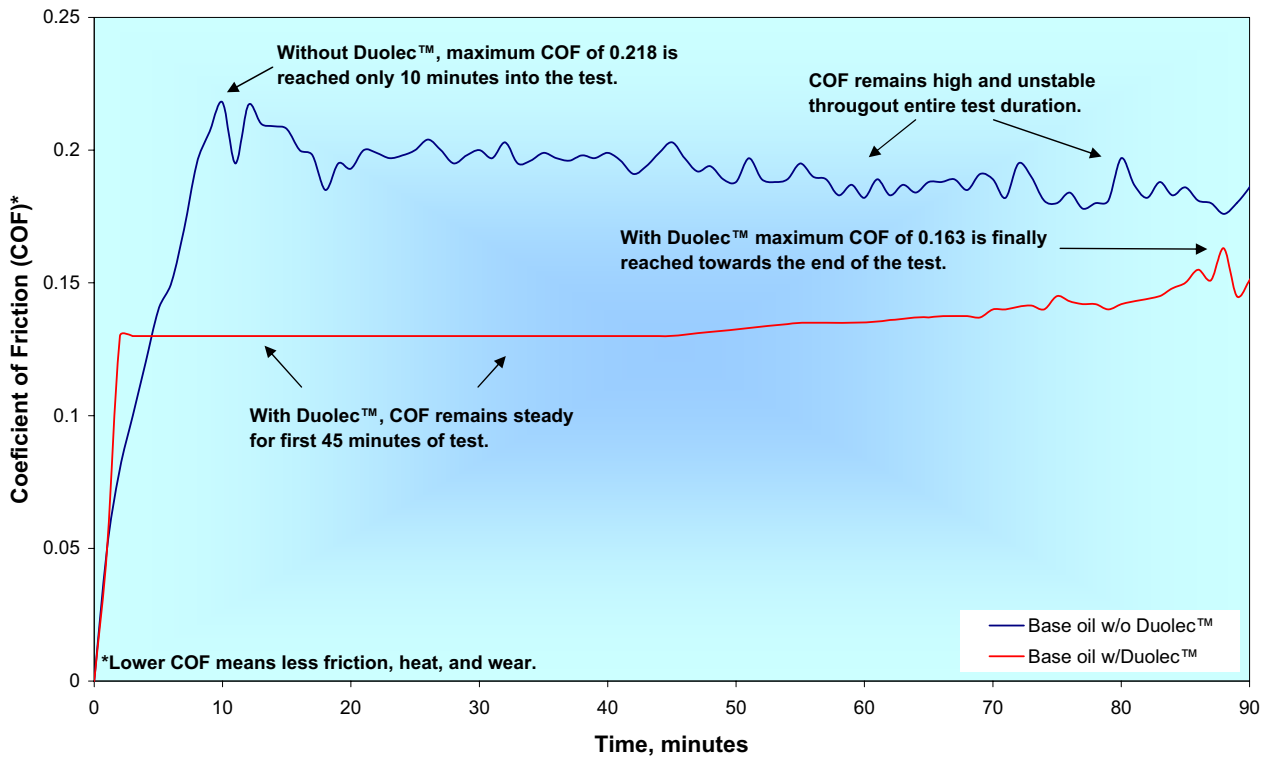
Leaders in Lubricants



ASTM Wear Test Evaluation



Measurements of Friction (SRV Test: T=50 C, Load = 100 N)



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