

Four-stroke engine oils



Base fluids and additives for superior engine oil performance and improved fuel economy

Cargill[®]

Four-stroke engine oil components for superior performance

Continued advances in global legislation has set the four stroke engine oil industry some difficult and very challenging targets which include the need for:

- Improved fuel economy and fuel economy retention
- Reduced emissions and protection of emission control systems
- Engine oil durability
- Low temperature fluidity
- Reduced engine fouling

These tough demands make for testing times for the engine oil formulator. In order to be successful in achieving industry targets, components that retain key performance characteristics and properties over extended periods of time are required. To support the formulator in meeting

new and evolving standards, we can offer a premium range of high performance low viscosity esters, organic friction modifiers and high viscosity complex esters. This range of products exhibits many attributes including:

- Superior thermal stability
- Low volatility
- Excellent anti-wear capability
- Reduced SAPS
- High viscosity index
- Increased oxidation stability
- Clean burn
- Low deposit forming
- Reduced coefficient of friction

Ester base fluids

In order to support your formulation needs, we offer a superior range of esters that can be used as additive solubilisers and seal swell agents, or as base fluids in the formulation of heavy duty diesel engine oils (HDDEO), passenger car motor oils (PCMO) and racing fluids.

Through many years working with the automotive industry, our team of technical specialists have the relevant experience necessary to offer advice in respect of product selection and treat rates in order to help deliver optimum engine performance.

| | Kinematic viscosity at 40°C (mm ² /s) | Kinematic viscosity at 100°C (mm ² /s) | Pour point (°C) | Flash point COC (°C) | Non polarity index (NPI)* | Viscosity index | Noack weight loss at 250°C/1hr (%) |
|---------------|--|---|-----------------|----------------------|---------------------------|-----------------|------------------------------------|
| Priolube 3963 | 5 | 3.2 | -78 | 230 | 55 | 149 | 14.6 |
| Priolube 3966 | 12.2 | 3.3 | -78 | 235 | 55 | 148 | 7 |
| Priolube 3970 | 20 | 4.4 | -48 | 250 | 60 | 140 | 3 |
| Priolube 1936 | 26 | 5.3 | -54 | 244 | 82 | 139 | 6 |
| Priolube 1976 | 26 | 5.4 | -35 | 260 | 216 | 157 | 4 |
| Priolube 1973 | 46 | 8.0 | -44 | 280 | 130 | 148 | 2 |
| Priolube 3999 | 90 | 14 | -27 | 290 | 195 | 144 | 2 |
| Priolube 3967 | 94 | 13 | -45 | 290 | 201 | 145 | 3 |

The data in this table represents typical properties.

*NPI is an indicator of the polarity of an ester; a lower number represents higher polarity and a higher number represents lower polarity.

Organic friction modifiers (OFMs)

With fuel economy continuing to be a major global concern for the automotive industry, the addition of a friction modifier to the engine oil formulation can provide significant performance benefits including:

- Reduced friction leading to improved fuel efficiency and lower CO₂ emissions
- Friction durability and synergy with inorganic friction modifiers, resulting in extended drain intervals
- Minimised wear whilst contributing to lower SAPS

Different engine oil formulations may require different friction modifier solutions to achieve optimum performance in respect of frictional properties and wear. Combining this knowledge and our expertise in ester and amide technology, we have developed a broad range of products which are free from sulphated ash, phosphorus and sulphur, and are highly recommended for use in engine oils.

Making the right choice of organic friction modifier will have a significant impact on the performance of the final engine oil. Our experienced technical specialists are available to offer advice and support, working with the formulator to select of the most suitable component or blend for a specific engine oil development.



| | Pour point (°C) | Iodine value (gl/100g) | Cloud point (°C) | Hydroxyl value (mgKOH/g) |
|----------------|----------------------------|------------------------|------------------|--------------------------|
| Optislip O | Pastille (melt point 69°C) | 90 | Pastille | 9 |
| Perfad 3000 | >21 | 25 | - | 26 |
| Perfad 3006 | - | - | - | 50 |
| Perfad 3057 | >21 | 4.7 | - | - |
| Perfad 4000 | -30 | 10 | -25 | 131 |
| Perfad FM 3336 | -25 | 5 | 12 | 204 |
| Perfad FM 3339 | -12 | 5 | -5 | 289 |
| Perfad NG 2500 | >21 | 4 | - | >35 |
| Priolube 1407 | 0 | 79 | 8 | 220 |

The data in this table represents typical properties.



Who are we?

The Energy Technologies business in Cargill Bioindustrial creates, makes and sells specialty chemicals and additives for the global energy market. Working in close collaboration with our customers, we apply sustainable concepts and deep scientific expertise so that together we can efficiently power the world of tomorrow.

At our core, we are experts in synthetic ester and polyalkylene glycol chemistries, taking products from lab scale through to full manufacturing. Investing in the development of new chemistries allows us to support our customers in meeting new industry challenges.

For those who dare to imagine a brighter future, we establish long lasting relationships and create bespoke industry solutions through our integrated research & development and global manufacturing capabilities. Being both global and local, you have direct access to our network of technical experts. We look forward to talking to you.

Further information

Cargill Bioindustrial sales and distribution are coordinated through an extensive worldwide network of technical and commercial experts. For further information or guidance please contact us:

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