



Industrial Gear Oils: Standards, Performance and Selection

Industrial gear oils are specially formulated lubricants used in enclosed gear systems to reduce friction, dissipate heat, protect against wear, and resist oxidation and corrosion. These oils play a critical role in ensuring the reliable and efficient operation of gear systems in a wide range of industries, including manufacturing, mining, steel, cement and wind power.

This article provides an in-depth look at industrial gear oils, including key technical requirements and a detailed comparison of relevant global standards: **ISO 12925-1, ISO 6743-6, DIN 51517 Parts I/II/III, and AGMA 9005-F16.**



OVERVIEW OF INDUSTRIAL GEAR OILS

FUNCTIONS

- **Lubrication:** Prevents direct metal-to-metal contact.
- **Wear Protection:** Protects gears and bearings from scuffing and micropitting.
- **Load Carrying:** Maintains film strength under high loads and shock conditions.
- **Oxidation Stability:** Enhances oil life by resisting thermal degradation.
- **Corrosion Inhibition:** Protects metallic components from rust and corrosion.
- **Foam Control:** Ensures stable lubrication by preventing foam formation.

TYPES

Industrial gear oils vary by composition and application:

- **Mineral-based oils** with additives, e.g., anti-wear, EP, rust inhibitors.
- **Synthetic oils**, e.g., PAO, PAG and esters, that offer superior performance at temperature extremes.
- **Bio-based oils** for environmentally sensitive applications.

KEY INTERNATIONAL STANDARDS

Feature	ISO 12925-1	ISO 6743-6	DIN 51517-Part II	AGMA 9005-F16
Type of Standard	Performance	Classification	Performance + formulation	Application guidelines
Classification System	L-CKB, L-CKC, etc.	CKB, CKC, CKD	CL, CLP, CGLP	R&O, EP, Synthetic
EP Protection Specified?	Yes (CKD, CKE)	Yes (CKD)	Yes (CLP)	Yes
Test Methods Required	FZG, corrosion, foam	Harmonized with 12925	FZG, oxidation, foaming	FZG, Timken, 4-ball
Viscosity Grade Reference	ISO VG	ISO VG	ISO VG	AGMA grades (≈ ISO VG)
Synthetic Oils Included	Yes	Yes	Not in CLP	Yes



SELECTION CRITERIA FOR GEAR OILS

When selecting an industrial gear oil, consider:

- **Gear Type:** Spur and helical vs. worm gears.
- **Load and Speed:** Heavier loads and lower speeds demand higher EP protection.
- **Temperature:** Use synthetic oils for high or low ambient conditions.
- **Contamination Risk:** Select oils with superior water separation or filterability.
- **OEM Specifications:** Always cross-check with manufacturer recommendations.

TRENDS AND INNOVATIONS

- **Micropitting-resistant oils:** For high-performance gearboxes.
- **Eco-friendly and biodegradable lubricants:** Especially in environmentally sensitive zones.
- **Extended drain intervals and condition monitoring:** Enabled by high-performance synthetics and IIoT sensors.
- **Gear oil compatibility with seals and paints:** Critical in modern, compact gear designs.

CONCLUSION

Industrial gear oils must meet stringent performance criteria to ensure the durability and reliability of gear-driven machinery. Understanding the specifications set by **ISO 12925-1**, **ISO 6743-6**, **DIN 51517**, and **AGMA 9005-F16** is essential for selecting the right lubricant for any application.

By aligning lubricant properties with machine requirements and relevant standards when selecting the right gear oil for the application, industrial facilities can significantly enhance operational efficiency, increase uptime and production, and extend equipment life.



Visit our site to learn more about our products and technical standards to determine the best option for your needs and applications.

ROYAL PURPLE® INDUSTRIAL GEAR OILS

BioMax™ Gear EAL (RPGL000-005) – Environmentally Acceptable Lubricant (EAL) gear oil that provides exception protection against high heat, heavy contact, sliding loads and start-stop shock loading in environmentally sensitive areas. Ecolabel certified.

Synergy® (RPGL007-012) – Ultra-tough, long life, EP industrial gear oil proven to make gears run smoother, quieter, cooler and longer without overhauls in virtually all conditions.

Synergy® Worm Gear (RPGL013-014) – Contains slippery synthetic molecules plus special anti-wear additives to provide the lubricity and oiliness properties necessary to excel in worm gear lubrication and protects against fatigue failure from sudden shock loads.

Synfilm® GT Wind Gear (RPGL015) – Synthetic gear oil specifically formulated to meet the challenging requirements of modern wind turbine gearboxes. The product improves turbine efficiency by reducing parasitic loss in the gear units and is proven to extend drain intervals while providing unparalleled bearing and gear protection

Thermyl-Glyde® (RPGL016-021) – Has all of the advantages of our Synergy® high-performance EP gear oil, but is recommended where severe operating conditions are encountered, including heavy loads, shock loads, low operating speeds, and high operating temperatures.

Thermyl-Glyde® Worm Gear (RPGL023) – Provides the lubricity and oiliness properties necessary to excel in worm gear lubrication. Uses a dense, high molecular weight, synthetic cushioning additive that protects against fatigue failure from sudden shock loads. They are also noncorrosive to both ferrous and nonferrous metals.

Thermyl-Tuff® (RPGL024-026) – Viscous, tacky, semifluid lubricant that protects extremely heavily loaded sliding surfaces where other EP products perform poorly or even fail. It cannot be washed off by water, and its superior synthetic corrosion inhibitors provide outstanding protection in wet or corrosive environments.