

FUNCTIONAL GA-360

Low Treat Zinc-Free Extreme Pressure (EP) Industrial Package

APPLICATION:

FUNCTIONAL GA-360 is an additive package used at low treat rates to produce a range of economical EP industrial oils and wireline fluids/greases in petroleum oils.

FUNCTIONAL GA-360 combines the traditional GL-5 active sulfur technology of **FUNCTIONAL GA-614** and the clean gear / low corrosion performance of **FUNCTIONAL GA-307**.

COMPOSITION:

FUNCTIONAL GA-360 contains AW/EP, corrosion inhibitors, defoamer/demulsifier, and antioxidants.

Typical Properties	
Appearance	Orange, Haze
Color – ASTM D1500	≤ 4.0
Odor	Aromatic
Lbs per Gallon	8.1 – 8.2
Flash Point – ASTM D92	150°C/302°F
Viscosity – ASTM D445	20 cSt @ 40°C
Elemental Analysis	11.4% S, 1.9% Ca

TREATMENT LEVEL:

FUNCTIONAL GA-360 is a fully blended additive package with defoamers and demulsifiers optimized for heavy Group I/II and paraffinic bright stocks.

- In EP oils: 2.0wt% for industrial gear (250 kgf weld), 4.0wt% for GL-5 EP performance (400 kgf weld)
- In wireline or downhole lubricants: 0.8wt% for basic R&O, 4.0wt% for EP

When testing in new oils always check ASTM D1401 demulsibility and ASTM D892 Sequence I/II/III foam. Use **FUNCTIONAL DF-400** defoamer and **FUNCTIONAL DM-240** demulsifier when needed.

See next page for performance details.

HANDLING:

Store indoors at 20-40°C (68-104°F). In its concentrated form, **FUNCTIONAL GA-360** may cause skin irritation and should be handled with suitable personal protection. See the Safety Data Sheet. **FUNCTIONAL GA-360** adds no hazards at recommend treat.

This Technical Data Sheet and the Safety Data Sheet contain information believed to be accurate and reliable. No warranty is made, however, to information beyond the control of FUNCTIONAL PRODUCTS INC. The engineering and management personnel of the user are responsible for determining the suitability of this or any product for any specific application, and this information is offered to them for that purpose.
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FORMULATION GUIDE:

EP Industrial Gear Oils:

Use **FUNCTIONAL GA-360** at 2.0 or 4.0wt% for industrial and heavy duty EP lubricants. Pour point depressant **FUNCTIONAL PD-610** is recommended at 0.1 – 0.5wt% for low temperature fluidity and winterizing the oil in heavy Group I/II and naphthenic oils.

Typical Performance in 150BS Paraffinic Bright Stock (ISO 460)		
Treat Rate, wt%	2.0%	4.0%
Weld Load, D2783	250 kgf	400 kgf
Weld Scar one stage before weld, D2783	2.01mm (200 kgf)	2.63mm (315 kgf)
US Steel Wear (20kg, 54C, 1800rpm)	0.34mm	0.49mm
Turbine Oil Rust, ASTM D665A	Pass	Pass
Copper Strip Corrosion, ASTM D130, 3hrs 100°C	1b	1b
Demulsibility, 180°F, D1401	15 minutes	15 minutes
Foam Stability, D892 – I / II / III	0/0, 20/0, 0/0	0/0, 20/0, 0/0
Wet Foam, D892mod (4vol% water) – I / II / III	0/0, 20/0, 0/0	0/0, 20/0, 0/0
Suitable For	US Steel 224	GL-5

Downhole / Wireline Lubricants:

FUNCTIONAL GA-360 is highly effective at providing moderate EP and corrosion protection in aggressive environments at competitive costs. These formulations are built using **FUNCTIONAL V-158FN** at 20-80wt% as thickener plus 60 to 100 SUS paraffinic or naphthenic oil to adjust the viscosity from ISO 68 to 13,000.

Suggested treat rates are:

- 0.8wt% **FUNCTIONAL GA-360** for wirelines and slicklines in oil wells (200/250 kgf weld)
- 4.0wt% **FUNCTIONAL GA-360** for heavy duty braided line greases (315/400 kgf weld)

Performance at 0.8wt% in Economy Wireline Grease (w/ FUNCTIONAL V-158FN)	
4-Ball EP Weld load, ASTM D2783	200 kg @ ISO 68-1000, 250 kg @ ISO 1500+
Turbine Oil Rust, ASTM D665A (distilled) / 665B (brine)	Pass / Pass
Copper Strip Corrosion, ASTM D130, 100°C	1b (3hr), 1b (24hr)
Demulsibility, ASTM D1401, 130°F or 180°F	40/40/0 (15 min) typical

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