

LA 650 ARMA SERIES INDUSTRIAL GEAR OILS

DESCRIPTION

LubeAlloy 650 ARMA Series Industrial Gear Oils are advanced PAES-SYN™ lubricants formulated to protect gears, bearings and seals in all types of enclosed-gear drives with circulation or splash lubrication systems at high and low temperatures meeting the designation of CLP (Clean, Lubricate, Protect).

The LA 650 ARMA Series are based upon the proven technology of Triotherm™ advanced additive extreme-pressure oils formulated for the lubrication of heavy-duty industrial gears. The high load carrying capacity and anti-friction characteristics combine to offer superior anti-wear/EP performance with energy savings in gears and other industrial applications.

HIGH TEMPERATURE AND OXIDATION RESISTANCE

Oxidation stability is an important factor in the prediction of an oil's performance. A high performance gear oil must achieve resistance to oxidation from high temperatures, presence of water, acids or solid contaminants acting as catalyst (eg, copper, iron) to prevent sludge and varnish within the lubricating oil. As temperature increases are precursors to the oxidation of lubricants, LA 650 ARMA Series are formulated on exclusive high performance PAES-SYN™ base oils with oxidation inhibitors to provide cooler operating temperatures in gear oils that circulate for extended periods. Reducing heat and therefore oxidation, oil life is extended by a factor of 4 – 5 x that of standard petroleum based oils.

ENERGY REDUCTION SAVING

Inclusion of Triotherm™ technology within the LA 650 ARMA Series has demonstrated lowering of co-efficient static friction under dynamic loads between mating surfaces. This results in low fluid friction in the load zones of non-conforming surfaces such as meshed gear teeth of helical, bevelled, hypoid gears and rolling bearings of industrial gearboxes. The lowering of co-efficient friction of LA 650 ARMA Series produces less voltage start-up draw and amperage consumption during operational periods of greater than 2.8% improvement in energy efficiency and whereby the energy efficiency scale is magnified in cold climate operations.

INCREASED WEAR PROTECTION

LA 650 ARMA Series ensures outstanding long term anti-wear protection to gears and bearings due to the exceptional load carrying characteristics of PAES-SYN base oils. PAES-SYN™ base oils outperform due to their high film strength and lubricity to reduce wear and maintenance and provide longer operating life of machinery.

ARMA Series Industrial Gear oils have demonstrated improvements to gear life through reductions in gear teeth fatigue/breakage, chipping, micro-pitting, spalling, abrasive and adhesive wear including plastic deformity.

RUST AND CORROSION – CLEANLINESS

Industrial gearboxes and circulating systems are often manufactured with ferrous metals as a primary build source and these metals are prone to rust and corrosion from the operating environment of those systems. LA 650 ARMA Series have verified exceptional cleanliness of the lubricant and metal surfaces in which water, steam and humidity including acid build are predominant in the plant or field. Protection is exhibited due to the PAES-SYN™ lubricity characteristics and the additive system to protect metal surfaces for extended periods of operation.

TECHNICAL FACT SHEET: LA-650-ARMA-SERIES

FEATURES AND OPERATIONAL BENEFITS

FEATURES	ADVANTAGES AND OPERATIONAL BENEFITS
Exceptional high temperature thermal stability and oxidation resistance	Increase equipment high temperature operating capability Prolongs oil life, reducing maintenance and disposal cost Eliminate insoluble and varnish deposits to enable efficient operation and long filter life
High Viscosity Index	Absence of wax in base oils Retains viscosity and film thickness at high temperatures Provides exceptional low temperature performance, lowering voltage draw at start-up
Reduced co-efficient static friction	Reduced friction and increase efficiency in sliding and rolling gear/ bearing mechanisms Measurable reduced power consumption and lower steady-state operating temperatures. Reduce the effects of micro slip in rolling contact bearings to extend rolling-element life
High load carrying efficiency	Protects metal surfaces under heavy loads due to lubricant adhering to metal surfaces under mechanical action of gears and bearings.
Balanced additive chemistry	Delivers exceptional performance in relation to rust and corrosion prevention, water separability, foam control and air release performance. Facilitate reduced maintenance operation in a wide range of industrial applications, and reduced operating costs

Energy efficiency relates solely to the performance of LubeAlloy 650 ARMA Series formulated with PAES-SYN™ technology when compared to conventional (mineral) reference oils of the same viscosity grade in circulating and gear applications. The formulated technology utilised allows up to >2.8% efficiency compared to the reference oil when tested in a worm gearbox under controlled conditions. Energy – Voltage/Amperage - efficiency improvements will vary based on operating conditions and application to test conditions.

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APPLICATIONS

LubeAlloy 650 ARMA Series are generally compatible with mineral oil based products, admixture may detract from their performance. It is recommended that before changing a system to LubeAlloy 650 ARMA Series products, it should be thoroughly cleaned out and flushed to achieve the maximum performance benefits. LubeAlloy 650 ARMA Series oils are compatible with most NBR, FKM and most other elastomeric seal materials that are used with mineral oils. As there is the potential for variations in the elastomers, it is recommended to consult your equipment supplier or seal manufacturer to verify compatibility.

LubeAlloy 650 ARMA Series lubricants are recommended for use in a wide variety of gear and bearing applications where high or low temperatures are encountered or where operating and/or bulk oil temperatures are such that improved efficiency is desired over conventional oils. They are particularly effective in applications where the maintenance costs of component replacement, system cleaning and lubricant changes are high. Selection of the specific viscosity grade include:

- Filled for life gearboxes, especially high ratio/ low-efficiency worm gears
- Remotely located gearboxes, where oil change-out is difficult
- Low temperature applications, such as ski lifts where seasonal oil changes can be avoided
- Mixer roll bearings and roll neck bearings where high temperatures are encountered
- Cement plants, Steel Mills, Mining applications, Plastic calenders, Windmills
- Severe centrifuge applications, including marine centrifuges
- Railroad A/C Traction Drives
- S68, S100, S150, S220 are suitable for Oil Flooded Rotary Screw Compressors compressing natural gas, field gas gathering, CO2 and other process gasses used in the natural gas industry
- Continuous operational time in use 24-30 months/5,000-6,000 hours dependent upon oil analysis.

SPECIFICATIONS AND PERFORMANCE REQUIREMENTS

LA 650 SERIES	S68	S100	S150	S220	S320	S460	S680
DIN 51517 Part 3 CLP		✓	✓	✓	✓	✓	✓
AGMA 9005 EO2	✓	✓	✓	✓	✓	✓	✓
ISO 12925-1 CKD	✓	✓	✓	✓	✓	✓	✓
US Steel 224 (AIST 224)	✓	✓	✓	✓	✓	✓	✓
David Brown S1.53.101	✓	✓	✓	✓	✓	✓	✓
GM LS 2 EP Gear Oil		✓	✓	✓	✓	✓	✓
MAG IOS Machine Gear		✓	✓	✓	✓	✓	✓
Flender/Siemens MD T7300			✓	✓	✓	✓	✓

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TYPICAL PROPERTIES

LA 650 SERIES	S68	S100	S150	S220	S320	S460	S680
ISO Viscosity Grade	68	100	150	220	320	460	680
Viscosity, ASTM D445							
cSt, @ 40°C	68	100	150	220	320	460	680
cSt @ 100°C	10.99	14.20	21.8	28.96	38.76	51.38	65.82
Viscosity Index, ASTM D2270	161	167	174	179	180	181	185
Density, @ 15°C	0.860	0.862	0.862	0.863	0.864	0.864	0.873
Appearance, Visual	Golden	Golden	Golden	Golden	Golden	Golden	Golden
Pour Point, °C, ASTM D5950	-57	-54	-48	-42	-39	-35	-33
Flash Point, °C, ASTM D92	242	239	235	230	232	235	228
Copper Corrosion, ASTM D130	1a	1a	1a	1a	1a	1a	1a
TOST, ASTM D943, hours	10,000+	10,000+	10,000+	10,000+	10,000+	10,000+	10,000+
RPVOT, ASTM D2270, minutes	2,500	2,500	2,500	2,500	2,500	2,500	2,500
FOAM test, ASTM D892 Seq I/II/III Tendency/Stability	10/0 20/0 10/0	0/0 10/0 0/0	0/0 0/0 0/0	0/0 10/0 0/0	0/0 0/0 0/0	0/0 0/0 0/0	0/0 0/0 0/0
FZG Gear Scuff Test, A/8.3/90, ISO 14635-1	12	12	13	13+	13+	13+	13+
FE8 D7.5/80-80 Bearing Test E DIN 51819-3 Roller Wear, mg loss, ≤30 Cage Wear, mg loss, ≤200	3 7	3 7	3 7	3 7	3 7	3 7	3 7
Rust protection, ASTM D665B, NaCl Water	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Oxidation Vis Increase, % Change <6% max, ASTM D 2893	3.2	3.2	3.2	3.2	3.2	3.2	3.2