

TECHNI/TIPS

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LE'S ALUMINUM COMPLEX GREASE AN EXCELLENT MULTI-FUNCTIONAL LUBRICANT

Aluminum complex greases have little in common with their conventional predecessors. While no grease can truly be an "all-purpose" lubricant, aluminum complex grease is a valuable multi-functional, multi-purpose product.

Aluminum complex soaps are formed by reacting two dissimilar acids with a suitable complex aluminum compound. The manufacturing of this type grease requires highly competent Grease Makers and sophisticated equipment. Aluminum complex greases began to appear in the mid-1960s, and a number of patents were issued over the next several years covering various modifications. Most of the efforts were in the areas of improved water resistance and thermal and mechanical stability.

Aluminum complex greases are easy to pump at low temperatures because of their relatively low soap content and higher oil content. They readily accept extreme pressure additives as well as the usual rust and oxidation inhibitors and the unique "specialty" additives. Formulations of specially selected oils and additives can be made to produce sophisticated lubricants for moderately lower and higher temperature conditions. The mechanical or shear stability of aluminum complex greases could best be described as in the range of "good to excellent".

APPLICATIONS FOR ALUMINUM COMPLEX GREASE INCLUDE:

Automobile Wheel Bearings: Aluminum complex greases with special additives are widely used in wheel bearing lubricants for automotive equipment with disc brakes. Because of the higher temperatures generated, other wheel greases could fail in these bearings. The aluminum complex grease stays in place with a minimum of leakage.

Manufacturing and Assembly Plants: Aluminum complex greases have been used as machinery and parts lubricants, especially where very wet conditions prevail. They are also widely used as Food Grade greases.

Steel Mills: Extreme pressure versions of aluminum complex greases have been used to lubricate hot and cold rolling mills, hot roll tables and other high temperature applications. Its reversibility, or ability to retain consistency after repeated heating and cooling, is unique. These greases are easily handled in centralized systems and/or bulk storage. The high water resistance of aluminum complex grease is also very helpful in these applications. The water resistance reduces leakage and the amount of lubricant in discharge water.

Boat Trailers: Aluminum complex grease has been used successfully to grease trailer wheel bearings and hitches. The excellent water resistance makes this grease a "natural".

Paper Mills. Lithium and anhydrous calcium greases have been tried on the wet and dry ends of the mill with limited success. Aluminum complex grease now lubricates both ends with no problems.

Rubber Industry: Aluminum complex grease is used to lubricate the Banbury mixers where they can be wet,

hot and corrosive atmospheres.

Textile Industry: Aluminum complex grease can be used for almost every application requiring lubricating grease. It stays in the bearings and reduces spotting of the cloth. It is also claimed that aluminum complex grease will scour out of the cloth being processed.

Farming and Construction: Aluminum complex grease is used as a general purpose lubricant and a bearing grease. Properly inhibited, it protects equipment from rust.

It is rare when a truly multi-purpose grease is developed that has the significant sales features that distinguish LE's aluminum complex grease. In many cases, multi-purpose greases look extremely good on specification sheets, but may have weaknesses in the areas not normally measured by ASTM test methods. These nonmeasured factors can be of real importance to today's lubrication specialists, and provide solid benefits to the ultimate user. In addition to processing outstanding specifications, LE's aluminum complex greases possess "hidden" customer benefits, including LE's proprietary and exclusive wear-reducing additives, along with a specific benefit for which aluminum complex greases are known. These are not gimmicks or "frosting on the cake". They are solid product advantages that can be of significant importance in today's sophisticated lubricant markets.

BENEFIT-HEAT REVERSION

While much is written about the dropping point of greases, little is mentioned about the heat reversion characteristic of greases. Good reversibility properties can be defined as the ability of the grease to revert to its normal consistency after it has been heated and cooled repeatedly. Many industrial and automotive applications involve intermittent temperatures within a bearing that will approach or exceed the dropping point of the grease. Grease in such bearings may return to an ambient temperature periodically. Also, if the grease in such an application does not maintain very nearly its initial consistency, it is obvious that the bearing is a candidate for failure. Aluminum complex greases, in addition to having a typical dropping point of 475°F (246°C), also rate "excellent" in heat reversion characteristics when compared to other multi-purpose greases. One example of how aluminum complex greases are being used to solve intermittent heat buildup problems is its use as a wheel bearing lubricant in automotive equipment with disc brakes.

CHARACTERISTICS OF ALUMINUM COMPLEX GREASES

Aluminum complex thickeners respond well to the proper additive treatment. These greases are marketed in both extreme pressure and nonextreme pressure versions, depending on the application requirements. They also respond well to additive treatment for wear protection and against rust and oxidation. Various types of specialty and proprietary additives can be added for special applications. There is always some degree of similarity between the various complex type greases. The aluminum complexes are no exception. These greases, however, have some unique qualities which are quite desirable and have contributed to the rapid increase in acceptance for both industrial and automotive applications.

A well-formulated aluminum complex grease will have excellent water resistance. Aluminum complex greases excel in resistance to both washing out of a bearing and being washed off a flat surface. This is highly desirable. Although the water resistance of multi-purpose greases varies considerably from product to product, aluminum complex greases most likely will be better in this respect than other multi-purpose products. This resistance to water washout is very important where it is necessary to prevent lubricating grease from entering plant discharge water. Lubricant consumption is also reduced. The shear stability of aluminum complex grease is only moderately affected by water in the grease.

Aluminum complex greases have dropping points typically in the range of 450°F to 475°F (232°C to 246°C) and

are, therefore, excellent for applications where temperatures exceed the operational range of other multi-purpose greases. The high dropping point allows a properly formulated aluminum complex grease to be used at temperatures above the dropping point of most straight lithium greases. The usual precautions of more frequent applications of fresh lubricant and a reasonable amount of bearing flushing with fresh lubricant should be followed when these greases are used at high temperatures.

A multi-purpose complex grease which has a high dropping point may prove to be only partly suitable for high temperature applications because alternate heating and cooling or shearing at a high rate at elevated temperatures may produce some undesirable physical change in the lubricant. Aluminum complex greases show little tendency toward such undesirable changes. This thermal stability is highly desirable on applications where these conditions are encountered, and the bearing is not easily inspected or relubricated at frequent intervals.

	Aluminum Complex	Lithium	Calcium	Bentone	Lithium Complex
Water Resistance	Excellent	Good-Excellent	Good	Excellent	Excellent
Mechanical Stability	Good-Excellent	Excellent	Poor	Good	Good
Compatibility	Fair	Good-Fair	Good-Fair	Good-Fair	Good-Fair
Dropping Point	475°F(246°C)	360°F(182°C)	350°F(177°C)	500°F(260°C)	500°F(260°C)
Heat Reversion	Excellent	Good	Poor	Good	Good
Low Temperature Pumpability	Excellent-Good	Good	Poor	Poor	Poor

Comparisons for typical NLGI 2 grade greases before addition of any special EP or wear-reducing additives, solids or trace colors.

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The comparative benefits listed above are met by **LE's 4700, 4701, & 4702 MONOLEC® Industrial Lubricants** and **LE's 1274 & 1275 ALMAPLEX® Industrial Lubricants**, which are all aluminum complex base greases. In addition, there are modified versions of aluminum complex greases, without EP additives, but containing the proper food grade oil to produce Food Grade greases which pass FDA requirements for H1 rated food machinery greases. These include **LE's 4023, 4024 Si 4025 QUINPLEX® Food Machinery Lubricants** which meet the USDA and FDA H1 requirements.

Aluminum complex combines well with chemical extreme pressure (EP) agents and various other specialty or proprietary additives. LE's aluminum complex greases are modified to meet the most exacting requirements and special application areas. One case in point is **LE's 4023, 4024 & 4025 QUINPLEX® Food Machinery Lubricants**. Another is the fact that **LE's 1274 & 1275 ALMAPLEX® Industrial Lubricants** are compounded with LE's proprietary additive ALMASOL®, to meet the specific requirements to make it LE's principal "inplant" lubricant. **LE's 1274 ALMAPLEX® Industrial Lubricant** NLGI 1-1/2 should be used in automatic lube systems for easy pumpability. This same type of grease, in the NLGI 00, 1 and 0 grades, is **LE's 4700, 4701 and 4702 MONOLEC® Industrial Lubricant**. They are compounded with LE's proprietary additive MONOLEC® to meet the requirements for a softer grease to be applied through automatic centralized lubrication systems.

LE keeps abreast of the latest technology in aluminum complex formulations to assure that the very latest technology is available in LE's aluminum complex greases. The ability of a grease to systematically release the

oil, while maintaining its mechanical stability and reversibility characteristics, denotes its quality. There are no better, or more stable aluminum complex greases than those produced by LE. The "bleed characteristics" of LE's aluminum complex greases are controlled by Federal Test Method No. 321 to be no greater than 2% bleed.

LE's aluminum complex greases make an unbeatable team of principal inplant greases-greases in grades that will meet most grease requirements in any sophisticated preventive maintenance plan in industrial, commercial and institutional applications.

LE's 1274 ALMAPLEX Industrial Lubricant	NLGI 1-112
LE's 1275 ALMAPLEX Industrial Lubricant	NLGI 2
LE's 4700 MONOLEC Industrial Lubricant	NLGI 00
LE's 4701 MONOLEC Industrial Lubricant	NLGI 1
LE's 4702 MONOLEC Industrial Lubricant	NLGI 10
LE's 4023 QUINPLEX H1 Food Machinery Lubricant	NLGI 0
LE's 4024 QUINPLEX H1 Food Machinery Lubricant	NLGI 1
LE's 4025 QUINPLEX H1 Food Machinery Lubricant	NLGI 2

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