

LUBE

TECHNI-GRAM



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WHAT IS A COMPLEX GREASE?

The word “grease” is derived from the early Latin word “crassus” meaning fat. A more modern definition would be “a solid to semi-fluid product of a dispersion of thickening agent in a liquid lubricant. Other ingredients imparting special properties may be included.” So, greases may be thought of as oil-saturated sponges, with the thickener holding the fluid in place. It is the lubricating fluid that performs the lubrication function.

Greases are primarily classified by their thickeners, the most common being metallic soaps. Other include polyurea and inorganic thickeners. Polyurea greases have been on the decline in recent years.

Soap-based greases are produced from three main ingredients: A fatty material (animal or vegetable) which is usually 4% to 15% of the total, called the **acid**. The next is the base or **alkali**, which is the opposite of an acid. Bases used in making greases include calcium, aluminum, sodium, barium and lithium, with 1% to 3% normally needed. The third portion is the **fluid**, which can be selected from mineral oils, various types of synthetics, polyglycols or a never-ending combination of fluids.

When a fat (acid) is cooked with the alkali (base), the process of forming soap by splitting the fat is known as saponification. When a fatty acid is used instead of a fat the process is known as neutralization. The metal hydroxides used in the manufacture of thickeners include barium, calcium, lithium and sodium. The metal used determines the name of the soap and the grease, i.e. barium-based grease, calcium-based grease, etc. These soaps impart very different properties to a grease and such thickeners are carefully selected to provide the properties needed for various applications. **IT IS IMPORTANT TO NOTE THAT ALL GREASES ARE NOT ALIKE AND SIMILARLY NAMED ONES ARE NOT OF THE SAME QUALITY.** This can be shown by noting the variety of fatty materials that may be used, either along or in combination, and very important, the various types and quality of oils which may be used.

A more complex structure can be formed by using a complexing salt, thus converting the thickener to a soap-salt complex, hence the term complex greases. Complex greases were developed to improve the heat resistance of soap greases, the most popular being lithium, aluminum, calcium and barium. They are similar to regular grease except that the thickener contains two dissimilar acids (one fatty, one organic), which impart high temperature characteristics in the final product. Complex greases offer about a 100°F (38°C) higher working temperature than normal soap-thickened products.

Complex greases provide a higher working temperature than the normal soap types and, in general, provide outstanding oxidation resistance, although this is not true in all cases. They are increasing in popularity with



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the aluminum and lithium being the front-runners. As an example, **SWEPCO 121 Tri-Plex Universal Grease**, an aluminum complex grease, has a 500+°F dropping point. SWEPCO 601 Moly Wheel Bearing Grease is a lithium complex grease with a 500+°F dropping point. SWEPCO 115 Food Machinery Grease is an H-1 aluminum complex grease with a dropping or “melting” point of 450°F. All three of these greases have a much higher temperature range than their traditional soap counterparts.

In Summary

Complex greases are those whose basic ingredients have been fortified, modified, or treated so that they give exceptional performance in a given application. Their complexity increases when certain other materials are added that change both their structure, their characteristics, and often their capabilities. Such changes in a soap-base grease often produce a lubricant whose performance behavior is a decided transformation. When such a transformation is beneficial to the service intended, the new grease is usually adopted as a replacement for the conventional types.