

LUBE

TECHNI-GRAM



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WHAT IS MOLYBDENUM DISULFIDE?

Molybdenum disulfide, sometimes referred to as Molysulfide or simply Moly Powder, is a purified form of the natural mineral, Molybdenite. The chemical name Molybdenum Disulfide means that two atoms of sulphur are chemically combined with one atom of the metal molybdenum.

Molysulfide is characterized by a plate-like structure. This plate-like structure, and the fact that the two-element compound arranges itself in layers of atoms, make Molysulfide a unique solid lubricant. As you can see in Figure 1, sulphur atoms and molybdenum atoms alternate in a sandwich-like lattice arrangement. This unique arrangement of the molecules in Molysulfide creates slippage planes between the molecules of Molybdenum Disulfide. Under pressure, even up to **500,000 lbs. Per square inch**, these layer-like deposits of Molybdenum disulfide slide or flow readily, one across another. This is the most important factor in the ability of Molysulfide to add to a phenomenal job of lubrication under the proper conditions.

HOW MOLYSULFIDE WORKS AS A GREASE ADDITIVE

Friction is caused by the natural roughness present on all metal surfaces. This roughness or metal nap is visible only through a high powered microscope and presents pits, valleys, and microscopic metal hairs. We've seen the unusual structure of Molysulfide in Figure 1, and notice also, that one side of the Molysulfide molecule has exposed bonds which have an affinity for tenacious adherence to metals. This is a natural affinity and is not a chemical reaction, but one comparable to the attraction of a magnet for metallic particles. In greases, Molysulfide is in the form of a fine particle sized powder. Since the sulphur portion of Molysulfide has a great affinity to metal surfaces, it is easy to understand that, as the lubricant is rubbed between two metal surfaces, the Molysulfide is forced against the surface of the metal. Once the contact between Molysulfide and metal is made, extremely high pressures will not readily force it away from the metal or bearing surfaces. This is the reason we refer to the Molybdenum Disulfide found in SWEPCO greases as the "insurance factor." As the micron and sub-micron particles fill the pits and valleys in the metal face, not only reducing the major basic cause of friction, but also remaining to lubricate and protect against metal-to-metal contact even if the greasing application should be neglected or overlooked.



... to keep it running

Even when the base carrier has been dissipated, the metallic film of protection which has become an integral part of the bearing surface, **but does not build up upon itself**, continues to keep friction at a low value until regreasing is accomplished.

In the film which Moly sulfide forms over the metal surfaces, a surface deposit one-millionth of an inch thick will represent forty molecular layers, making thirty-nine easy sliding slippage or cleavage planes (please see Figure 2). A simple demonstration of this characteristic of Moly sulfide to form easy sliding parallel planes would be to have forty smooth square pieces of metal lying one on top of the other and a film of grease between each piece of metal. Any combination of pressure and motion on top of the pieces of metal will send them sliding easily in the direction of the motion.

Due to its inherently low coefficient of friction, strong affinity for metals, and extremely high film strength and unique “plating out” ability, the proper use of Molybdenum Disulfide in a formulated lubricant can result in the following benefits:

- Reduction of friction and wear
- Lowering of energy consumption
- Lowering of operating temperature
- Reduction of equipment down time
- Reduction in hard part replacement costs
- Prolonging of lubricant and equipment life

Important Note: It is extremely important to recognize that all Molybdenum Disulfide is not the same. Molybdenum Disulfide is produced in a varying degree of purity and particle size. Southwestern Petroleum Corporation utilizes an optimum level of the purest and finest particle size recommended for superior performance in greases ... the Technical Fine grade ... in the manufacturing of all SWEPCO greases containing Molybdenum Disulfide.

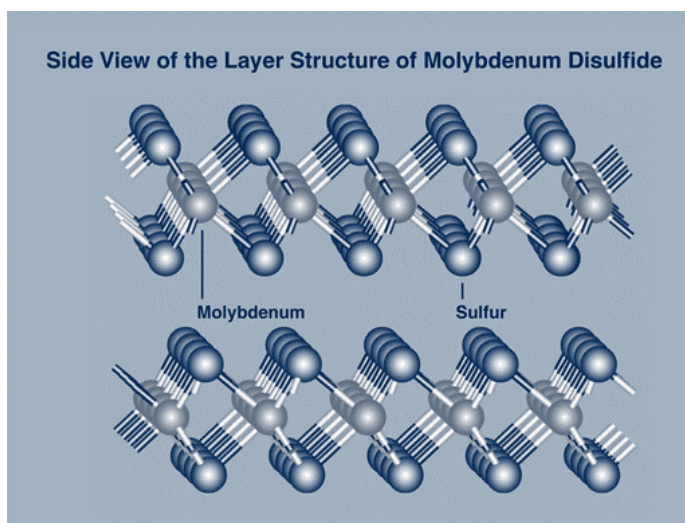


Figure 1

Affinity to metal This is a simplified diagram showing the moly sulfide lattice arrangement . It shows how layers of sulphur atoms have an almost magnetic affinity to metal, but easily slide over each other to create the slippage planes which give moly sulfide its low coefficient of friction.

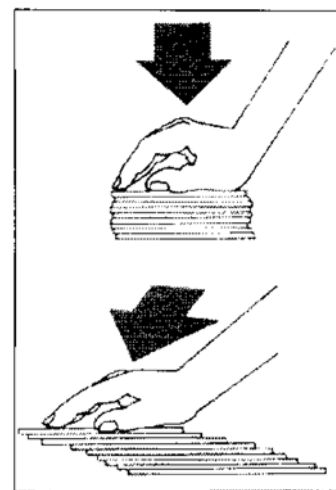


Figure 2

Great numbers of easy-sliding parallel planes exist in minute particles of Moly sulfide.