MOLYDUVAL® Special Lubricants



MoS2 - Effectiveness & Applications

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1. General Information on Molybdenum Disulphide

Molybdenum Disulphide (MoS2) is a compound which is formed by processing and refining of naturally occurring Molybdenite Ore. Although Molybdenite is found all over the world only ores from selected sites are suitable for refining into lubricant grade Molybdenum Disulphide. The majority of Molybdenite mined is used in the manutacturing of Molybdenum (Moly) based steel compounds, as chemical additives and fertiliser trace elementsc

To qualify as a lubricant grade, the Molybdenum Disulphide must be produced to very high purity tolerances and graded according to the level of residual contaminate, particularly silicon and iron.

2. How Does Molybdenum Disulphide Work

Molybdenum Disulphide has a laminar structured crystal shape, composed ofMolybdenw1l and Sulphur atOms which have a natural affinity or attraction to metal surfaces. Once adhered, its lubricating action can be described as like a deck of cards or a ream of paper .

If the cards are placed onto a flat surface this represents the bond between the Molybdenum Disulphide and the metal surface.

If a sliding force is applied to the deck of cards, the cards slide easily over each other. Thi,.> represents the natural lubricating action ofMolybdenum Disulphide and also illustrates the low frictional or easy sliding characteristics of Molybdenum Disulphide. The frictional coefficient ofMolybdenum Disulphide is only 0.03.

If we replace the cards and then apply a rapid and heavy load to the top of the card deck, the cards prevent the striking surface from gaining contact with the flat surface.

This Illustration relates to the exceptionally high load carrying capacity of Molybdenum Disulphide which is greater than 450,000 psi.

3. Uses of Molybdenum Disulphide

Molybdenum Disulphide is a unique lubricant in its own right, and is often used in powdered form to be burnished (polished) onto bearing surfaces and components for total life lubrication or as an assembly compound.

The Molybdenwn Disulphide Powder can be incorporated into resin mixtures to form solid dry film lubricants which are used to coat components prior to assembly or for the in service lubrication of components operating in dusty or oxygen rich environments.

The Molybdenum Disulphide Powder is very frequently included into grease formulations to improve extreme pressure load carrying capacity of a grease, to improve its shock load carrying capacity and anti wear properties. The main uses for these greases are in Mining, Steel and Heavy Industry applications for open gear, plain and anti-friction greases, as well as anti-seize compounds.

The Molybdenum Disulphide Powder can be further refined to produce colloidal particles ofMolybdenum Disulphide which are dispersed in oil bases to form colloidal dispersions.

These are used to add to oil systems to provide extreme pressure and anti-wear properties to the oils, similar to those in greases.

Molybdenum Disulphide reduces friction and improves a lubricants boundary lubricating qualities. The use of Molybdenum Disulphide will:-

Help Reduce Operating Temperatures Reduce Component Wear Rates Increase the load carrying capacity of a lubricant

MoS1 Reduces Operating Friction MoS1 Improves Component Life

3.1 Molybdenum Disulphide as an Oil Supplement

GFS Colloidal Dispersions of Molybdenwn Disulphide are added to various oil systems to provide the benefits of anti-wear and load carrying capacity. The amount of Oil Supplement added to an oil is dependant on the oils application, and is based on the load carrying requirement of the oil, the speed of circulating of the oils and the viscosity of the oil used.

As a general guide GFS 20% colloidal dispersion of Molybdenum Disulphide is added at the following dosages:.

	Millilitres per litre oil
Hydraulic Oils	15
Circulating Oils	15
Compressor Oils	15
Wire Rope Oils	20
Chain Oils	20
Engine Oils	25
Automotive Transmission Oils	75
Automotive Differential Oils	75
Industrial Gear Oils	75
Heavy Viscosity Total Loss Oils	100

Effeœtiveness In Oil

Colloidal Molybdenum Disulphide is a very effective wear reducing and friction reducing lubricant. Many Engineers and Oil Chemists considered that because Moly is a solid, with a density six times that of Mineral Oil. it should not be used in oil products because it well separate and form deposits. This is possible with poorly formulated products (those which do not have the microfinemoly particles and high quality dispersants) and it Happened frequently with products up to the late 80'5, before the present dispersion technology was available. The specialised production and technical staff producing todays product know how to produce a stable colloidal dispersion which will not separate. The GFS colloidal dispersion produced now has an average particle size of 90% less than half a micron and all particles less than 1 micron, it does not settle out.

The USe of colloidal Molybdenum Disulphide (MD) in oil will reduce friction, improve component life and improve component efficiencies.

Molybdenum Disulphide is a wear reducing solid lubricant. It improves the wear resistance of the surface to which it adheres. While the basic characteristics 0(the oil remain unaltered.

Molybdenum Disulphide (MD) is a solid lubricant that supplements the oil to improve overall wear life of the lubricated parts - GFS Colloidal Molybdenum Disulphide (MD) Is not an 011 Additive -It supplements the existil,g 011

The friction reduction increases available horse power by reducing triction within the moving parts in the engine. This extra horse power can either be used as power or will show up as a reduction in fuel consumption of about the same amount.

Tests and field results from many of the users of GFS colloidal Molybdenum Disulphide (MD) Colloid have further varified this result with improvements in horsepower output up byas much as 10% and reductions in fuel consumption as high as 150/Q.

GFS colloidal Molybdenum Disulphide (MD) has been used very successfully to reduce wear in engines, gear boxes, automatic transmissions, hydraulics and compressors, as well as other oil systems such as wire rope and chain lubricants. Rates of wear on average have been reduced by as much as 50% and more.

GFS colloidal Molybdenum Disulphide (1vID) has been found to work very effectively in the reduction of wear in many oil lubricated systems and its effectiveness has been tound to be far superior to other oil additives and supplements available.

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The following graph shows the comparitive wear reducing qualities of some of the major competitive additive prodUCts available compared to GFS colloidal Molybdenum Disulphide ('MD). These products were all tested in a proprietry 20WSO Grade Engine Oil.

These results clearly show the superior wear reducing qualities of GFS colloidal Molybdenum Disulphide (MD). Testing was carried out by an independant NA T A approved testing laboratory and all product blends were made up according to the manufacturers instructions.

Wear testing was carried out using the Shell four ball testing machine using standard testing method IP239 with a preset load of 60kg and run for 1 hour . The following table serves to clarify the results obtained.

These results clearly show the superior wear reducing properties of GFS colloidal Molybdenum Disulphide (MD) compared to the major competitive products available.

These competitive products represent the major additive technologies used in the petroleum industry and include solid lubricants (PTFE), extreme pressure additives and viscosity modifiers. The results clearly show the superior perfomla11ce of GFS colloidal MolybdenUln Disulphide (MD) to reduce wear.