LS Polar rock drill oils
vs 000 Rock drill grease

Liquid Shield Polar rock drill oils / air tool lubricant
Powerful, economical protection for miners and equipment

Background

Rock drill greases were introduced as pneumatic tool lubricants as a means to reduce oil fog generated during drilling, etc. They are also touted as capable of reducing tool wear. We conducted our own tests to evaluate the ability of rock drill greases to withstand temperatures typically encountered in percussive drilling.

The table below outlines industry recommendations for grease selection, based on operating temperatures:

Dropping points of various grease complexes - Operational temp's should be 50°C. lower		
Type	Dropping Point °C	Maximum service temp. °C
Simple lithium	175	120 - 135
Lithium complex	>250	150 - 180
Polyurea	>245	150 - 180
Lime soap	90	60 - 70
Anhydrous calcium	140	90 - 110
Calcium complex	>232	130 - 150
Modified clay	>280	190 - 220
Sodium	165	90 - 120
Sodium complex	>250	150 - 180
Aluminum complex	>250	130 - 150
Calcium sulphonate complex	>260	190 - 200

Lubricators:

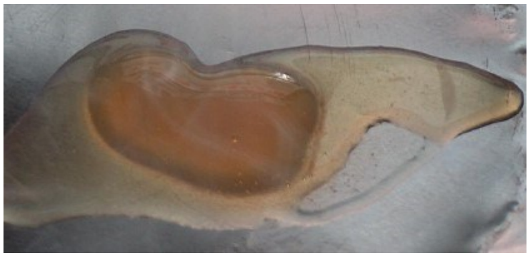
The most common lubricator used in underground drilling is the Joy style football lubricator. It operates on the venturi principle. The lubricator is filled with oil, and compressed air passes through the center of the lubricator. A ported siphon tube passes from the oil reservoir through the compressed air tube. The compressed air passing the siphon tube creates a vacuum which draws lubricant into the compressed air stream. The lower the viscosity of the rock drill oil, the more oil will be drawn into the compressed air tube. Rock drill greases resist flow more than conventional rock drill oils, which is why manufacturers are able to claim that lubricant consumption can be reduced by as much as 50%. Although the prospect of savings on lubricant consumption appears, at first, to be a sensible idea, the impact on lubrication effectiveness casts doubt on that notion, based on examination of a commonly available rock drill grease properties.

Liquid Solutions Inc. - 16 Community Avenue - Unit 1, Stoney Creek, Ontario, Canada L8E 2Y2 **liquidsolutions.ca**
Phone: (905) 510-2443 **Email:** kklayh@liquidsolutions.ca ***or*** vince@rockdrilloils.ca Fax: (844) 891-3845 **rockdrilloils.ca**

Heat tolerance tests:

A 000 grease from a large international oil company was tested for its tolerance of heat.

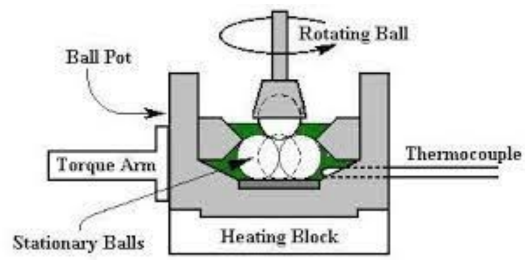
The first test was simply to slowly heat up the grease and to observe physical changes. It was noted that at around 260°F (127°C.) the grease began to separate into its basic components (see photo below):



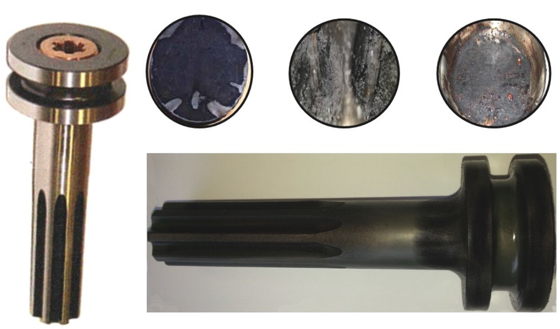
The light colored fluid around the periphery is the carrier mineral oil, while the darker component is the complex soap thickener component of the 000 grease. As the grease breaks down into individual components, it becomes difficult to predict its ability to provide adequate lubrication.

Four ball wear test:

The next test for the grease was to subject it to four ball wear testing. The grease was poured into the ball pot and covered all four balls. The top ball was rotated against the lower balls at a load of 59 Kg., and the lubricant was heated to between 100 - 130°C. (212°F and 266°F) Tests were conducted for 40 minutes. The photos below describe the reaction of the grease to these physical forces.



It is clear that the grease separated during the four ball wear test, and left deposits of the complex soap thickener component on the bearings. The thickener also accumulated within the bowl of the four ball tester. During interrupted drilling, temperatures can rise to well over 218°C (425°F) as heat generated within the core of drill parts is no longer cooled by compressed air, and the heat that accumulated in the core of the drill parts radiates to the surfaces of the parts. This sort of heat is readily demonstrated by the buildup of carbon on percussive pistons (see photo below).



Elevated heat forces rapid and complete drying of the grease. In time, the grease can reach a state of consistency ranging from hard putty to sandstone, depending on the thickener type and degradation conditions.

The impact of grease deposits left on tool surfaces during high temperature intervals

Deposits such as those pictured at left can eventually block critical lubricant and air delivery passages, accelerating wear and causing potential tool failures.

The vulnerability of the 000 rock drill grease to drying out and hardening suggests that reducing the flow of fresh lubricant to the tool would probably exacerbate the problem. The cost of a well designed lubricant that can tolerate high temperatures and will not form abrasive deposits is much lower than the cost of repairing or replacing equipment parts, which necessitates down time loss of productivity.

LS series polar rock drill oils

Liquid Shield polar rock drill oils are high temperature tolerant up to 315°C. (600°F). This ensures excellent tool wear protection under severe operating conditions. The photo below demonstrates the stability of our polar rock drill oils when exposed to high temperatures. The test at left demonstrates that at a sustained temperature of 227°C (441°F) for 20 minutes, our rock drill oil did not separate or form deposits.

Liquid Shield rock drill oil Product Review:

This recent review of Liquid Shield polar rock drill oils was made by a Senior Mechanical Superintendent for a global mining contractor, (references on request) with many years of experience in configuring and maintaining mining equipment systems. He selected LS-220 polar rock drill oil for use in an extremely hot, humid mine, which was experiencing issues with equipment. Results were accumulated for over 12 months.

"I can attest to the quality of your rock drill and air tool oils. Having set up many pneumatic operating systems in a variety of weather conditions as well as compressed air systems that have not always been pristine have proven the excellent results that Liquid Solutions provide. As far as I am concerned there is no down side to your oil, equipment operates better longer which drops maintenance and replacement costs. I have performed many in house tests on equipment after using Liquid Solutions just for my own peace of mind and found that wear and tear on moving parts was very minimal even after being used far past usual maintenance periods. I could go on and on about the benefits because equipment that operates trouble free in extremely harsh environments is something that makes me very happy. Safety can also be added to the benefits because the less equipment has to be changed out, repaired or rebuilt quickly in a time of need leads to less chances of incidents as equipment maintenance can be planned proactive rather than reactive."