

NYE



lubeletter

FROM: WILLIAM F. NYE, INC., P.O. Box G-927, New Bedford, Mass.

DESIGNER'S TOOL

Damping Greases for Motion-Control

A designer is ignoring a powerful tool if he does not include the lubricant as an interacting design material. This is especially true in hand-operated devices where the capacity of "controlled-shear" gels or damping greases to operate as "motion control compounds" can affect tolerances and other design parameters including choices of metals, plastics or elastomers.

The usefulness of damping greases extends from their ability to quiet noise in the gear trains of small vending machine motors to their use in imparting a "velvet feel" to the control knobs on sophisticated electronic equipment. In this latter area, we meet some unusual quality control standards. One of our customers has an engineer who personally checks out the "feel" on his firm's potentiometer product. This has led us to suggest, not altogether facetiously, that his hands be registered with the National Bureau of Standards.

A more traditional market for damping greases has been with optical instruments, where binoculars, cameras, riflescopes, surveying instruments and, more recently, lasers can all require specially-formulated, non-corrosive, long-lived greases of a controlled high viscosity to provide smooth motion of focusing threads and slides and avoid "coasting" of hand-turned controls. An area where the synthetic hydrocarbons have made an impressive contribution is with outdoor optics, where use well below zero must be obtained along with stability in the trunk of a car in the desert sun.

Our family of damping greases encompasses over fifty different materials, including some of the least expensive as well as some of the most costly items in our product line. The latter group includes extreme wide-temperature greases, usually fluorocarbon-gelled, incorporating specially-synthesized silicone polymers, to provide damping quality without freezing at -65°F. or losing viscosity at +400°F.

Should you suspect that a "motion-control" or "noise-damping" grease might improve performance of one of your products, please let us send a selected sample. You can use the Lubeletter Response Coupon on page 3 to tell us about the application.

CLOSING THE WINDOW

High Viscosity Ester Oil for Oven Chain Lubrication

For high temperature applications such as oven chains, tenter frames and curing oven linkages, there has heretofore been a "window" of varying size between 300° F. and 400° F. where reasonably-priced synthetic oils show only limited life. This is especially true where the lubricant has to operate in "thin-film."

The process of oxidation speeds up significantly in thin film, but evaporation or volatility can be even more important. Volatility is very much a function of molecular weight. It has been difficult over the years to take full advantage of the proven oxidative stability of traditional diester and polyol ester synthetic oils, since most are relatively low molecular weight esters and increasing their molecular weight limits wide temperature fluidity.

We have been searching for a new molecular design for a higher viscosity ester oil as a candidate for high temperature, thin-film industrial conditions. By anchoring an aromatic ring at the center of the molecule and constructing the ester around it, stable higher viscosity esters can be constructed. Using one of these esters as a base oil, we are offering Nye Synthetic Oil 602, a 220 centistoke (at 100° F.) fluid, stabilized against oxidation with good anti-wear fortification. Evaporation in 48 hours at 300° F. is less than 1.0%. Low temperature usefulness does not extend below 0° F., but this is usually not a constraint in oven chain situations. Evaluation samples and a data sheet are available on request. Comparative evaluation with other synthetic chain lubricants is recommended.

RHEOTEMP 500

Long-Life Grease For Critical Ball Bearing Applications

Ball bearings which must operate at high temperatures and at very high speeds have been successfully lubricated for years by a novel synthetic grease heretofore manufactured by one of the major oil companies. The inherent high cost of this unusual material has limited market size; and, as with other specialty lubricants made by the major oil firms, the product has become of limited interest to them but remains of critical interest to the many customers who have depended on it for dependable lubrication of high-performance devices.

WILLIAM F. NYE, INC. has obtained a license to continue manufacture of this specialty grease under our label Nye Rheotemp 500. It is a thixotropic grease with a dark blue color and has demonstrated superior performance at temperatures of 350°F. and higher and at bearing speeds up to 65000 rpm. Low temperature capability extends into the military range of -65°F.

High temperature performance in a Type 204 bearing at 10,000 rpm shows average hours to failure as follows:

at 350°F.	1,050 hours
at 400°F.	180 hours
at 450°F.	60 hours

The grease has given over 5000 hours of life at 300°F. in the Navy high temperature motor bearing test of MIL-L-15719A.

Rheotemp 500 is gelled with a novel combination of gelling agents and contains additives which together impart good load-carrying and anti-wear characteristics. Successful applications extend from a variety of aircraft accessory equipment to high speed miniature fans for cooling electronic equipment.

The limited interest of the former manufacturer in the future of this grease means that it has not been promoted or recommended for many critical bearing applications in recent years. The renewed prospect for its long-term availability as Nye Rheotemp 500 should recommend it to a great variety of our readers who are faced with the steadily-widening range of automotive underhood temperatures and the elaboration of automotive accessories exposed to such temperatures. Although it is not currently qualified to any particular Military Specification, it has been accepted for a wide variety of Military needs, especially in aircraft.

We have a new data sheet available on Nye Rheotemp 500 and are offering evaluation samples at no charge upon request. We welcome inquiries from anyone with bearing life problems within -65°F. to +350°F. operating environments.

MICRO-ROCKS

Ultraclean Oils For System Reliability

Precision applications such as instrument ball bearings demand clean lubricants. A particle as small as one-thousandth of an inch in diameter (25 microns) in the path of a rolling ball in the raceway of a high speed miniature bearing would be comparable to an anvil on a railroad track. Noise, wear and reduced life expectancy result from particulate contamination in oils, leading to decreased reliability of a system.

We have long had the capability for filtration of fine oils to sub-micron levels and have custom-cleaned a variety of products for a few special customers. Most manufacturers of precision bearings have their own clean rooms and carry out sub-micron filtration of bearing oils as part of precision-bearing manufacture. As a result, our list of specialty customers for ultraclean oils has been limited.

We see, however, an expanding interest in ultraclean lubricants arising from their increased reliability as engineering materials. An analogy in a chemical laboratory would be the choice of the most highly-purified analytical reagents so that they contribute minimum error to an analysis scheme.

As part of a new development program in the ultraclean grease area, we are expanding our clean room and filtration equipment. We feel that we should do more to expand awareness of this unusual facility and to explain our ultraclean oil service to a wider range of lubricant users.

After filtering, we package our filtered oils into scrupulously-cleaned amber glass bottles. The final product is statistically analyzed for particulate contamination according to well-established dirt-counting and sizing procedures. Our ultraclean oils can usually meet or exceed the cleanliness classification of Level 100 of MIL-STD-1246A.

There may be significant and critical needs for cleanliness in the special lubricant you are using which would justify engineering your facility for use of ultraclean oils. We are anxious to work with any interested firms who could profit from the availability of ultraclean oils. Inquiries are invited.

RHEOLUBE 951

Ultraclean Grease For Low Speed and High Film Strength

There are many ball bearing applications, especially among smaller bearings, where conditions are not so much strenuous as "delicate." Low-speed bearing operation, where boundary lubrication is the rule and an elastohydrodynamic film cannot be expected, poses special problems. The low-speed motion may be small, of very low and reversible amplitude, even vibratory. Critical demands for high lubricity and low friction and torque sharpen the overall problem, which becomes not just low speed friction reduction, but the prevention of fretting corrosion. Operation to extreme low temperatures is often required. "Stick-slip" must be avoided. A typical application of this type would be a gimbal bearing for a gyroscope or a tracking antenna.

Demands of this type require very light greases based on stable, low volatility, medium viscosity oils with a good viscosity-temperature relationship. The best possible film strength is essential, as is the absence of dirt particles in the grease which could lead to erratic performance.

The polyol esters have the best combination of boundary lubricity, low volatility in thin film, and a wide temperature range of operation. A high-melting grease with exceptionally-good starting and low-speed running torque is being produced by WILLIAM F. NYE, INC. from a blend of specially selected polyol esters gelled with a stearate soap under carefully controlled conditions.

We are offering this grease as our Nye Rheolube 951. This grease is prepared in an ultraclean condition using newly-developed grease filtration techniques. Cleanliness as measured in particles per cubic centimeter has been measured from a typical lot as shown below:

Particles 10 to 35 microns	493 (1,000, max.)
Particles larger than 35 microns	zero (zero, max.)

This grease would meet or surpass the cleanliness requirements of MIL-G-81937. Useful temperature range is -65°F. to +250°F. with higher operating temperatures possible under inert atmospheres or in closed systems.

Rheolube 951 is available in the ultraclean grade only and is packaged in 30 cc plastic syringes or in 1-pound glass jars. A bulletin has been prepared and will be sent on request.

NYEFILM 501 (PTFE)

NYEFILM 554 (MoS₂)

Dry Film Lubricants From Brushable Liquids

The use of an aerosol spray can for application of dry film lubricants to the small components of delicate machinery is awkward at best and often totally impractical. Brushing or dipping would be a far more appropriate application method; however, we find few brushable liquids among dry-film lubricant products.

Molybdenum disulfide and polytetrafluoroethylene are both extremely versatile dry-film lubricants for the most difficult of environments, involving high vacuum, minimum volatility, or wide temperatures from cryogenic levels to 600°F.

Brushable liquid suspensions of either of these dry film lubricants are available as Nye specialty products. Each incorporates a special binder in a fast-evaporating non-flammable solvent. For molybdenum disulfide, our product label is NyeFilm 554. For polytetrafluoroethylene, the label is NyeFilm 501. The inorganic bonding agent is cured by atmospheric moisture, giving a firmly-held, water-resistant and abrasion-resistant dry lubricating film. Resistance to leaching by organic solvents or oils is also impressive.

Samples and data sheets for either NyeFilm 554 (MoS₂) or NyeFilm 501 (PTFE) are readily available on request

TWELVE POUNDS OF PAPER

Catalogs - A Collection of Specials

At least twice a week we're asked, "... and send me a complete catalog of all your products!" To which our ladies respond, choking back sobs, "of course!" Easier promised than done, because we have over 800 different lubricant and specialty formulations. The best way we can respond is to send our "Summary Catalog" which is a collection of roughly thirty different product bulletins, representing our most widely-sold oils and greases along with representative products from many different specialty areas, including:

- ball bearing oils and greases
- sintered bearing impregnating oils
- wide temperature instrument oils and greases
- synthetic wormgear greases
- barrier films to retard oil creep
- non-spreading oils
- damping greases
- extreme high temperature greases
- chemically-resistant oils and greases
- watch and clock oils
- lubricant kits for field service

For electric contact applications, we have a newly-revised catalog of lubricants for Switches and Electric Contacts. Here again this is mostly a collection of product bulletins, although more comprehensive for the application area. The latest edition does include newly-prepared editorial material giving general background on lubricants for:

- switch greases
- contact oils
- potentiometer greases
- connector lubricants

Other specialty catalogs include bulletin collections for (1) camera repair and service and (2) surveying instruments.

Your requests for any catalogs will be welcomed and quickly serviced.

AUTOPHOBICITY

Variety In Non-Spreading Oils

To be "autophobic" is to be afraid of oneself. The term is applied in the field of lubrication to a group of very unusual oils which do not wet their own adsorbed films. They deposit an initial film of themselves on a metal or jewel surface; the surface energy of this film is such that the remaining fluid does not wet it. As a result, a drop of oil develops a high "contact angle" with the surface and is effectively non-migrating. It stays where it is applied.

This quality has been of critical importance in timepiece lubrication where tiny jewels and pivots must be lubricated for extended periods by extremely small drops of oil. The oils which have been successful non-spreading watch and clock oils are all unusual chemicals, all involving aromaticity in the molecule with resulting high surface tensions. To obtain pour points below zero from aromatic structured fluids is not easy, nor do such materials usually have good lubricity or film strength.

Thus, there are very few successful non-spreading oils available commercially. Over a twenty-year period, Nye has developed a relatively broad line of these unusual oils with varying low temperature properties and special modifications to improve film strength. The principal three are listed here.

Oil Label	Viscosity, cs.		Pour Point, °F.
	100°F	0°F.	
Astro Oil	9.9	156	-65
Special Oil 3000	28.7	2,500	-40
PML Oil 79	56.0	9,560	-30

The first two of these oils are used for a wide range of delicate instrument and camera needs, especially where very low moving forces or outdoor temperatures are involved. PML Oil 79 is a standard non-spreading oil for wrist watches, and there are two modifications of the basic formulation.

PML Oil 92 for delicate ladies bracelet watches

PML Oil 163 for larger clocks and timers

Because of the unusual nature and limited exposure in commerce of the non-spreading oils, many needs for fine oils in delicate devices have compromised with soft greases, oils which creep, or dry films which have no self-replenishing capacity. If you have any such situations, we would be pleased to furnish complimentary evaluation samples of our non-spreading oils.

RESPONSE COUPON

CUT ALONG THE ABOVE LINE AND MAIL IN YOUR COMPANY ENVELOPE TO:

WILLIAM F. NYE, INC. - P.O. BOX G-927, NEW BEDFORD, MASSACHUSETTS 02742, Tel. (617) 996-6721

(Make Sure Your Correct Address Appears On The Reverse Of This Coupon)

SEND LITERATURE ON THE FOLLOWING:

Send at no charge or obligation a lubricant sample especially selected to meet the following needs:

Type of Mechanism _____

Components to be Lubed _____

Materials of Construction _____

Ball or Sleeve Bearing (if either)? _____ Sintered Metal? _____

Preference for Oil _____ Grease _____ Dry-Film _____

Is Oil Creep a Problem? _____

SPECIAL REQUESTS OR COMMENTS:

Will Lube Touch Plastics? _____ Type: _____

Elastomers? _____ Type: _____

Lowest Operating Temperature _____ °C/°F. If an electric contact,

Highest Operating Temperature _____ °C/°F. is arcing expected? _____

Desired Life at High Temperature _____

Present Lube _____

If unsatisfactory, in what way? _____

OIL CREEP CORNER

Barrier Film In Aerosol Spray

Once again we can supply our NyeBar barrier film in an aerosol container and we are suggesting this package as a vehicle for evaluating this unusual product for special mold-release applications.

NyeBar - Type CT is a very stable fluorocarbon polymer which adheres in ultra-thin film to most clean solid surfaces and by virtue of its uniquely low surface energy, renders them non-wettable by lubricants or other functional fluids. Its earlier uses were for ball bearings to prevent loss of oil by creep from the raceway. More recently, a variety of uses has developed in small control and timing devices where entire components are coated with the barrier film to limit oil contamination of critical electric contacts. The new spraycan version uses carbon dioxide as propellant; however, since the polymer is a fluorocarbon, it is necessary to use a blend of fluorocarbons as the solvent vehicle. The 6-ounce spraycan, containing a 0.2 wt percent solution of NyeBar - Type CT sells for \$16.50

A new bulletin has been prepared for NyeBar - Type CT and we would be pleased to send a copy and a small evaluation sample of the 2.0% solution on request.

WASHTANK SURVIVAL

Solvent - Resistant Heat Sink Compound

Printed circuit boards and other electronic assemblies can be put through an obstacle course of solvent rinses, detergent washes and similar environmental excursions before they are released into the marketplace. Whether these treatments are undertaken to remove solder flux, excess potting components or for whatever other good reason, the treatment can be worse than the disease on any functional organic compounds present on the device or its assembled sub-components.

The trauma inflicted on the lubricants in assembled switches is a problem yet to be satisfactorily solved; however, for heat sink compounds, traditionally used in electronic assemblies to improve heat transfer from an electronic heat source to a dissipation field, such as the assembly chassis, solvent wash resistance can now be made available.

Nye Heat Sink Compound 907 is a fluorinated grease which is not readily dispersible in organic solvents, including trichlorotrifluoroethane. Its resistance to intensive detergent attack is time-dependent, but is sufficient to protect against reasonable wash cycles. This solvent-resistant heat sink compound has a thermal conductivity comparable to the widely-used silicone-based, metal oxide-filled heat sink compounds and possesses the other traditional required qualities in that it is non-drying, non-bleeding, non-hardening and non-melting.

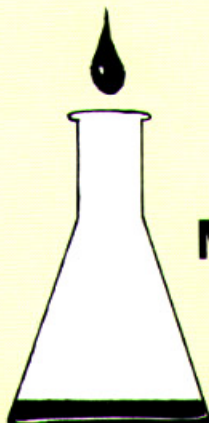
Freezing point of the base fluid is -20°F. and oxidation stability extends beyond 400°F.

This is an example of the unusual nooks and crannies of special lubrication into which our investigations frequently extend. Perhaps its availability suggests other unusual problem needs for specialty compounds based on functional fluids, and we invite any suggestions to attack new targets. In the meantime, we would appreciate any opportunities to send a sample of Nye Heat Sink Compound 907 to interested evaluators.

from: **WILLIAM F. NYE, INC.**
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MASSACHUSETTS 02742
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New Developments in Specialty Lubricants