



The SmartGrease Company®

Damping Grease



*An Engineering Tool for Economical
Noise and Motion Control*



From Cameras to Cell Phones: The Evolution of Damping Grease

Every day design engineers face the challenge of economically controlling free motion and noise in mechanical components. When the devices are operated by hand, they also have to design-in a “velvet feel” to satisfy the customer’s quality expectations. Damping grease is one of the most cost-effective ways to achieve these design goals.

Using damping grease as an engineering tool to control noise and motion is not a new concept. In the 1930s, damping grease played a pivotal role in transforming delicate, expensive 35mm cameras into a rugged and affordable consumer product. A small amount of damping grease on focusing threads delivered smooth, silent operation and a high degree of precision that put photography within anyone’s reach.

Nye Lubricants took damping grease to a new level in the 1980s. Early damping greases became too viscous at low temperatures. Nye developed a family of wide-temperature damping greases that maintained a functional viscosity from -40°C to 125°C. The auto industry immediately recognized the potential. Automotive switch manufacturers were the first to use Nye’s new damping greases — to eliminate the annoying “click” from low-cost plastic parts, and to give hand-operated switches a luxury “feel” without a luxury price tag. Soon, damping grease was specified in designs for door locks, parking brakes, glove box hinges, seat tracks, retractable cup holders, grab handles, window visors...more than 30 different auto interior components.

In the 1990s, Nye pushed damping greases into more demanding applications. Nye introduced new formulations that remained functional under high shear. Heavily loaded mechanisms, such as rack and pinion steering systems, could now rely on damping grease to absorb road vibration and prevent it from transferring through the steering column to the driver. The shear-stable damping greases also improved the performance of lightly loaded, frequently actuated components, such as plastic gears in office printers.

As new technologies were introduced, new applications for damping grease were discovered. Nye damping greases are now used to control the motion, noise and “feel” of inkjet printers, computer mouse key pads, camcorders, “flip” cell phones, furniture hinges, medical devices and other quality products.

Today, Nye manufactures the world’s broadest line of synthetic damping greases. And we continually formulate new damping greases to deliver the precise acoustic and tactile properties engineers want from their designs. Like every product in Nye’s SmartGrease™ family, our damping greases are engineered to “know” how you want your product to perform.



A Damping Grease Primer

What is damping grease? First and foremost, damping grease is grease — a buffer against wear and corrosion. All greases are formulated by mixing an oil with a thickener. The thickener holds the oil in place until the grease is sheared, by a lever, gear or detent, for instance. Then the oil is released to lubricate the moving parts.

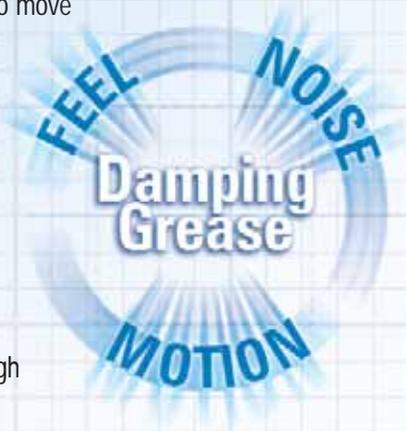
The difference between standard grease and damping grease is shear resistance. Damping greases are formulated with viscous (high-molecular-weight) synthetic oils, giving them a high internal shear resistance. While standard greases are slick, almost like cream cheese, damping greases are more like sticky peanut butter. When damping grease is applied to mated, moving parts, it's difficult for parts to come into physical contact. It also takes a degree of force to move through the grease. Since moving parts do not come into contact, there is little, if any noise and wear. And because a force is required to move the parts, there is little chance of free motion when the force is removed.

Engineering the “feel” and sound of a device. Damping grease allows engineers to adjust the torque required to actuate a device — to craft the user experience economically. The amount of force needed to shear a damping grease is determined by the viscosity of the base oils chosen for the formulation: the higher the molecular weight, the greater the shear resistance, the higher the torque. Generally, the more delicate the device, the lighter the grease. The “feel” of a hand-operated device can therefore be fine-tuned through proper base oil selection.

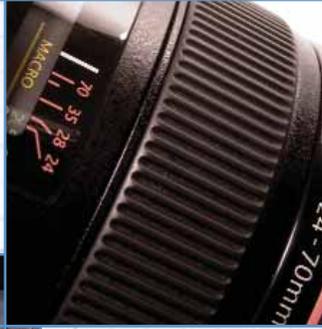
The acoustics of a device can be controlled in the same way. On focusing threads, for example, damping grease delivers a “quiet swish.” On detents, it can create a distinctive sound to indicate different settings. The lighter the grease, the more audible the sound.

Smart Damping Grease. Because damping greases can be formulated along a continuum of viscosities, Nye can recommend or formulate damping greases to match an engineer's specifications for noise, motion, and torque. Most damping greases from Nye are suitable for service temperatures between -40°C to 125°C. Nye also offers damping greases that are functional from -60°C to 200°C and higher.

Damping grease is an economical way to enhance the consumer's product experience, which makes it a compelling option for today's design engineers who want a versatile tool for noise and motion control.



How Design Engineers are using Nye Da



Automotive Interiors

Some OEMs require door actuators to operate in virtual silence; others want audible feedback when the door is locked or unlocked. Different viscosity damping greases can meet both requirements. A transparent, stay-in-place damping grease also gives retractable cup holders, seat tracks, ashtrays, and grab bars a quality sound and feel when actuated, offering a low-cost route to high-end appeal.

Rack and Pinion Steering

Applied to gear teeth and the yoke-rack interface, damping grease minimizes gear and yoke wear and reduces "rack knock." The damping effect of the grease also delivers a smooth, quality feel to the whole steering system.

Power Mirrors

The plastic exterior housing of electrically controlled side mirrors acts like an acoustic amplifier that creates an annoying buzzing sound. A light viscosity damping grease in the mirror's gears reduces vibration and noise.

Starter Motors

Galling of the solenoid piston in starter motors can lead to starter failure or "click, no crank." A water-resistant damping grease mitigates the problem. In addition to reducing wear, damping grease slows the motion of the piston to minimize gear misalignment and gear knock. By extending gear life, it also reduces warranty claims.

Printers

Damping grease in desktop printers reduces the rattle of plastic gears. Top brand manufacturers of inkjet printers, laser printers and multi-function peripherals have already learned this secret of quality management and consumer satisfaction.

Medical Devices

A plastic disposable insulin delivery device uses damping grease to control the speed at which the insulin is injected. Without the damping grease, the patient may not receive the proper dosage. The principle at work is the ability of damping grease to temper initial energy and transform it into a consistent applied force.

Damping Greases



Appliances

Damping grease gives control knobs on ranges and other white goods a “quality feel.” Light viscosity, almost “pourable” damping greases are also used to quiet gear boxes in countertop appliances.

Hinges

Most grease is used to lower resistance. The measured stiffness of damping grease increases resistance. Flip phone hinges, stadium seats, and spring-loaded doors on audio equipment and fine cabinets all use damping grease to “smooth out” motion. In some cases damping grease can replace a gear train to create controlled motion.

Dials, Slides, Switches

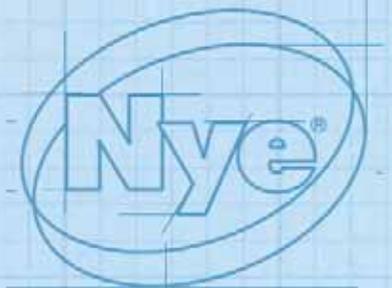
Damping grease improves the perceived quality of hand-operated, plastic dials, slides and switch components. The “stickiness” of the grease absorbs a loose fit and imparts a smooth “quality feel.” The viscosity of the grease can be varied to achieve specific acoustic or tactile characteristics.

Bearings

Bearings used in low speed, heavily loaded applications can benefit from damping grease. In steering column bearings, for example, it is used to absorb vibration and reduce noise. Damping grease can also add precision to any manual positioning device that relies on a bearing.

How You Can Use Damping Grease

Call one of Nye's global engineering offices for help in selecting a damping grease that will improve the performance of your next design. To locate the Nye engineering office nearest you, log on to SmartGrease.com.





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ISO 9001:2000
ISO/TS-16949



ISO 14001

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