# Chevron SRI Grease NLGI 2 – A Users Guide

**Chevron SRI Grease NLGI 2 is recommended for the lubrication of rolling element bearings, particularly ball bearings running under high temperature and high-speed conditions.**

The progenitors of Chevron SRI Greases were first introduced to the marketplace in the late 1960s and early 1970s. These early products gained rapid acceptance as rolling element bearing greases because of the longer bearing lives achievable with polyurea greases (due to the inherent antioxidant properties imparted by polyurea) when compared to lithium and other soap-thickened greases. Today, Chevron SRI Grease NLGI 2 is recommended for the lubrication of rolling element bearings, particularly ball bearings running under high temperature and high speed conditions.

## Application Guidelines

An application guide is shown below:

| Performance Requirements | Chevron SRI Grease NLGI 2 |
|---|---|
| Operating Temperature Range | -30° to 177° C<br>-22° to 350° F |
| Very High Speed<br>(dN = 250,000 +) | Recommended |
| Low Noise Operation | Satisfactory |
| Low Shear Stability | Satisfactory |
| Corrosion Resistance | Recommended |
| Water Resistance | Recommended |
| Dispensable from CIBC | Recommended |

Note: dN = bearing pitch diameter x bearing rpm
CIBC = Chevron Intermediate Bulk Container

In situations where low noise operation and low shear stability are critical to an application or are specified by an original equipment manufacturer (OEM), Chevron SRI Grease NLGI 2 is the correct choice. Low noise operation and low shear stability are manufacturing specifications for this product.

## Chevron SRI Grease Characteristics

### Shear Behavior

A key feature of Chevron polyurea greases is the way in which they react to shearing (the movement of one lubricant layer with respect to another). At low shear rates, as with simply stirring the grease, working it in a grease worker (used for the grease penetration specification test, P60) or pumping it through a long section of small diameter tubing, the greases tend to soften. In contrast, at high shear rates, as in a rolling element bearing or a grease homogenizer (part of the grease manufacturing process), the greases take on a harder consistency. Generally, this behavior is advantageous for a rolling element bearing grease. However, in the late 1970s and early 1980s, Chevron was informed by several users that in certain applications, Chevron SRI Grease seemed to be purging excessively from bearings, apparently due to low shear softening of the grease.

In order to reduce the extent of low shear softening, Chevron reformulated SRI Grease in 1985 to incorporate a low shear stabilizer. The effectiveness of this change was assessed using the extended work penetration test, P(100,00-).

Typical comparative data for SRI Grease with and without the low shear stabilizer are shown below:

| | SRI Without Low Shear Stabilizer | SRI With Low Shear Stabilizer |
|---|---|---|
| P(100,00) | 450 or higher | 380 or lower |

While Chevron SRI Grease NLGI 2 will continue to have good low shear stability, the extended low shear penetration test is not a manufacturing specification for this product.

## Noise Properties of Chevron SRI Grease NLGI 2

### Background

The quiet running properties (noise) of greases used to lubricate deep groove ball bearings (such as those used in electric motors) have become increasingly important to bearing manufacturers in their selection of factory-fill greases. Historically, bearing manufacturers became increasingly concerned about bearing vibration that manifested itself as audible sound as the demand grew for quieter machines.

As bearings were machined to finer tolerances, becoming inherently less noisy, the noise contributions of the greases used to lubricate them became increasingly apparent. Consequently, the major bearing manufacturers began independently developing instrumentation which allowed measurement of the contribution of grease to bearing noise. In addition, correlation of bearing life with the presence of contaminants promoted an even greater concern with grease noise testing because the assumption is often made that grease noise always correlates with the presence of contaminants, and therefore, with shortened bearing life.

Although most grease manufacturers would agree that knowing the noise characteristics of a grease does not provide sufficient information to allow prediction of the life of a bearing lubricated with it, noise testing is nonetheless increasingly used to assess the overall quality of ball bearing greases. Grease manufacturers therefore must be concerned with the noise quality of their products and with the various methods by which grease noise quality is determined if they are to continue to supply greases to the bearing manufacturing industry.

Although grease noise testing has been the subject of numerous publications over the past several decades, no standard test instrument, test bearing or test protocol has been adopted by either grease suppliers or bearing manufacturers during this time. In fact, a bewildering variety of proprietary grease noise testing methods is currently in use, particularly in the bearing manufacturing industry, where each major bearing manufacturer has developed its own proprietary instrumentation and methods. In addition, each method is considered by its proponents to provide a competitive edge for the company which uses it.

### Noise Testing

Because of the above considerations, testing the quiet running (noise) properties of Chevron SRI Grease has been an issue from the time of introduction of the product. During the 1970s a manual test was developed which allowed assessment of the running properties of a batch of grease by the feel of a bearing packed with it.

As the noise quality of bearings themselves improved, it became necessary to be able to detect lower and lower levels of bearing vibration. By 1988, Chevron Research (Richmond, CA) had begun to use a modified bearing vibration level tester (anderometer) to test for grease noise and had begun to carefully study the effects of additives and processing variables on grease noise. The anderometer, which was originally developed to assess bearing vibrational quality, measures the radial displacement of the outer race of a bearing as a function of its rotation. In fact, the name anderon is an acronym for "angular derivative of the radial displacement." In physical terms, the anderon is expressed as displacement distance per unit rotation:

1 anderon = .62 micro inches/radian

Bearing vibration is detected by a sensor head which is in contact with the outer race of the test bearing. The sensor signals are amplified and filtered into three frequency bands which span the range of audible sound frequencies:

| | |
|---|---|
| Low: | 50 – 300 Hz |
| Medium: | 300 – 1,800 Hz |
| High: | 1,800 – 10,000 Hz |

Vibration (noise) due to grease can be detected in the medium and high frequency bands. In the earliest version of the Chevron grease noise test, the highest recorded vibrational spike recorded in the medium band during a one minute run, was averaged for five bearings and the average reported as the grease anderon value.

In 1992, Chevron refined its test instrument, adding noise pulse counting capability. The pulse counter allows the detection of transients (vibrational pulses) which are too minute to be recorded on the strip chart recorder. During a test, the signal level in each band is displayed on a corresponding meter and is recorded on a strip chart recorder while the pulse counter detects and displays a figure proportional to the number of vibrational transients which occur above a preset threshold amplitude level. At the end of each test run, the medium band pulse counter reading is noted and the strip chart record of the medium band signal is examined. The first five seconds on the chart are disregarded as start-up noise and the highest amplitude peak (spike) anderon value recorded during the remaining 55 seconds is noted. Results for five bearings are averaged and reported as anderon spike value/pulse count.

### Low Noise Product Manufacture

Chevron takes extraordinary care in the manufacture of the Chevron SRI Greases in order to produce a low noise product. The product is manufactured in special reactors which have been outfitted to reduce production of noise-generating particles. All process oil and additive solutions are specially filtered and each batch is noise tested as described before it is released for packaging. All Chevron SRI Grease is carefully packaged to prevent contamination of the product. Product packaged in drums is covered by a special polyethylene sheet to prevent contamination of the surface of the product when the drum is opened. Prevention of contamination is critical to maintaining low noise performance of the product.

### Aging Effects on Low Noise Product

It is important to note that the six anderon max. noise specification is for freshly manufactured Chevron SRI Grease NLGI 2. Samples that are tested two months or more after the date of manufacture (either from packed bearings or from

unused containers) may give higher initial noise test values than those measured for the freshly manufactured product. However, after 30 to 90 seconds of running time, bearings packed with Chevron SRI Grease NLGI 2 typically return the grease to its original low noise condition.

## Texture and Appearance

Chevron SRI Grease NLGI 2 is smooth and buttery when packaged. Upon standing, it can take on a "set" and become resilient to the touch. This resilience develops within a few days after packaging, but it in no way affects the lubricating performance of the grease. The grease may also exhibit a slightly "lumpy" or "grainy" texture or develop minor surface cracking, often in association with some oil bleeding as it ages, usually after a period of several weeks to several months. Again, no loss of lubricating performance is associated with this texture change. The smooth, buttery texture of the grease is restored by simply stirring the grease or by the action of a grease pump in dispensing the grease.

As with any product having a finite shelf life, Chevron SRI Greases should be purchased and used in as fresh a condition as possible. We have designated a shelf life of two years for Chevron SRI Grease.

## Oil Separation

As mentioned in the previous section, it is normal for the Chevron SRI Greases to show some minor surface cracking accompanied by some oil bleeding. Oil separation values of up to 3 percent have been seen. Chevron SRI Greases showing 3 percent or less oil separation can be expected to lubricate normally. If it is desired to measure separated oil, the following guidelines may be helpful.

## Measuring Separated Oil

Carefully remove the lid from the container. Do not allow the lid seal material to drop onto the surface of the grease. Make certain that the surface of the grease is level (e.g. not high in the center). Allowable surface oil should not exceed the following:

| Package Style | Allowable Depth of Oil Above the Surface of the Grease |
|---|---|
| 35 lb pails | .3 inches (8 mm) |
| 120 lb kegs | .7 inches (18 mm) |
| 400 lb drums | .9 inches (23 mm) |

If separated oil is found in new, unopened containers and is not found to be excessive by the definitions above, take the following actions:

- The oil can simply be poured off (or can be removed by means of an absorbent bag or other absorbent material) and the container resealed. Grease performance will not be harmed.

- The oil can be stirred back into the grease using a large spatula, the surface of the grease can then be smoothed and the container resealed.

Note as well that surface cracking has no effect on the performance of the grease. Dispense as normal.

## Pumpability

It is important to distinguish between a grease's ability to flow through piping or tubing (pumpability) and its ability to "slump" to the inlet of a grease pump. Chevron SRI Grease NLGI 2 shows good flow characteristics when pumped through pipe or tubing. However, because of the resilience mentioned earlier, the undisturbed greases do not slump well. This means that grease pumps which pick up grease from the bottom of a grease container may have difficulty in dispensing the SRI Greases. Therefore, Chevron recommends that for best results, a top feeding or "ram-type" grease pump such as the Johnstone Model 1001 HDE drum pump (Johnstone Pump Company, Troy, Michigan) be used for dispensing the grease. After the grease has been through the pump, it will flow easily through piping.

## Conclusion

This User's Guide is intended to explain to the user some of the unique characteristics of Chevron SRI Grease NLGI 2. For further information, please contact your Chevron Lubrication Business Manager or LUBE-TEK at 1-800-LUBE-TEK.





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