



SHELL GADUS E6 2400

An exceptional grease designed for high quality auto-components

SUPPORTING THE LATEST AUTOMOBILE AND ELECTRIC VEHICLE INNOVATION

Shell Gadus E6 2400 is an exceptional grease for **automobile, including Internal Combustion Engine Vehicles (ICEV) and Electric Vehicles (EV).**

- Designed using the latest technology in its formulation and manufacturing.
- Optimised for use in polymer/metal and metal/metal contact applications.

STEP CHANGE IN PERFORMANCE

Auto-components lubricated with Shell Gadus E6 2400 showed better overall performance under field trials and laboratory tests for typical operating challenges including:



Noise



Friction



Corrosion



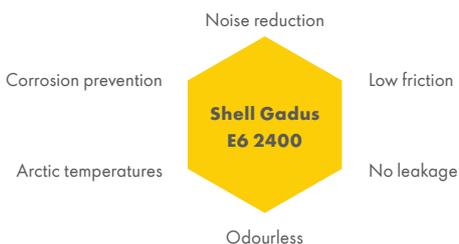
Leakage



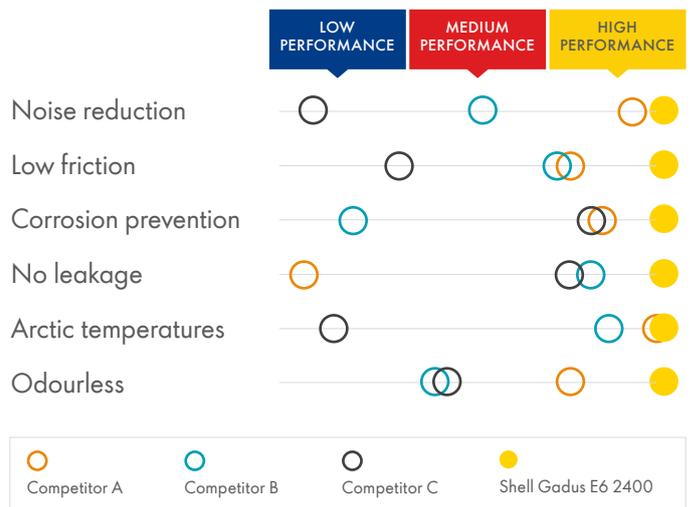
Arctic temperatures



Odour



BENCHMARK FOR FAILURE PREVENTION



Competitor A



Competitor B



Competitor C

WHERE IS SHELL GADUS E6 2400 USED?

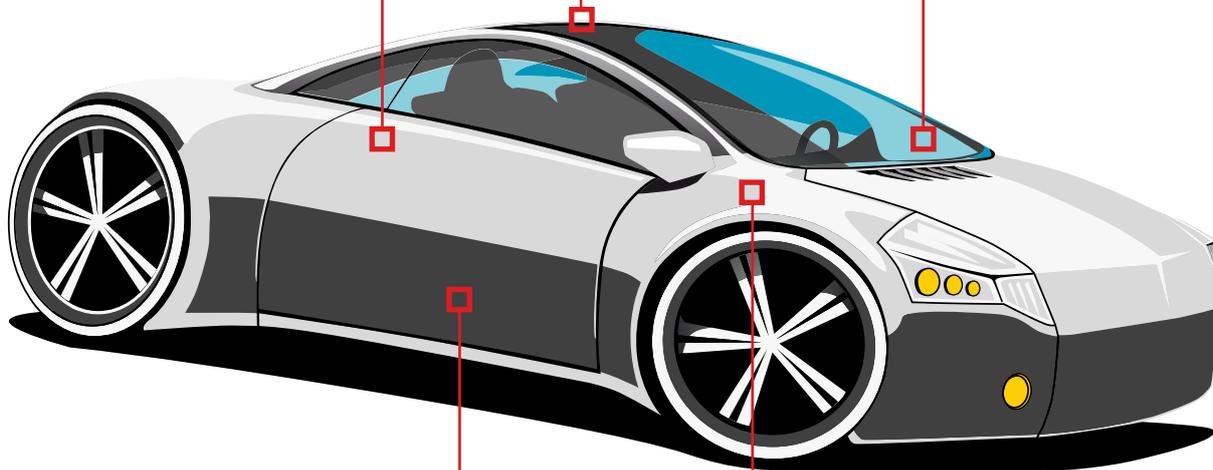
Shell Gadus E6 2400 is developed for steel-steel and plastic-steel lubrication contact in gear motors, actuators and adjuster systems for auto component applications including:



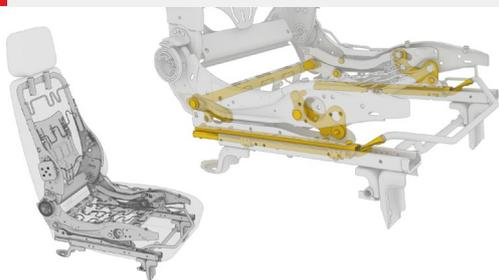
1 WINDOW LIFTER, SUNROOF SYSTEM, AND DOORS LOCK SYSTEM



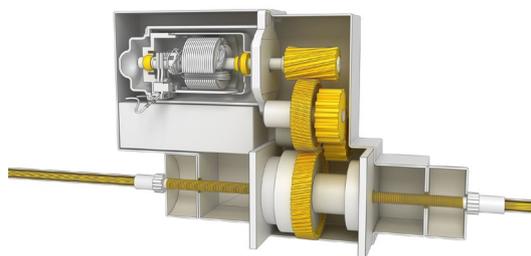
2 WINDSHIELD-WIPER SYSTEM



3 SEAT MECHANISM



4 EPB SYSTEM



COMPATIBILITY

Shell Gadus E6 2400 is compatible with:

- Metals and polymeric materials used in the equipment and related systems
- Other greases used in these and related applications

NOISE REDUCTION

Challenge

- Moving components can be noisy.

Solution

- High quality greases can help to reduce noise, particularly for electric vehicles.

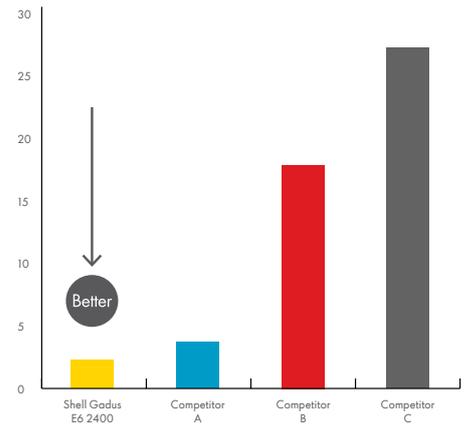
GREASE NOISE TEST

- Bearing filled with test grease.
- Run in a rig with sensitive noise detectors.
- Noise frequencies and intensities analysed.
- Lower values mean less noise.

Shell Gadus E6 2400 shows the quietest behaviour in the SKF BeQuiet and FAG MoreQuiet tests. Competitors B and C show very "loud" behaviour.

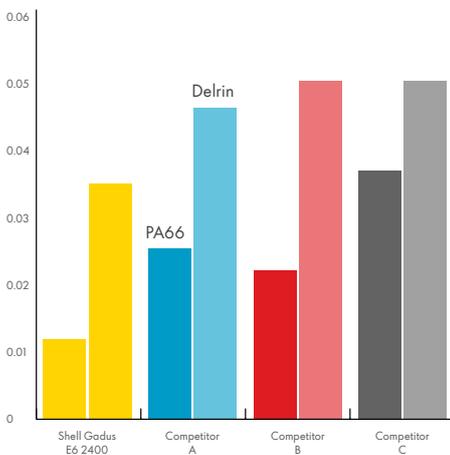
NOISE TESTING – AVERAGE NOISE

Amplitude, $\mu\text{m/s}$



STEEL/POLYMER FRICTION

Friction coefficient



CONTROLLED FRICTION

Challenge

- Moving objects, such as window winders, need to have as low friction as possible.

Solution

- A good grease will show low friction with relevant speeds, loads, and materials.
- For electric vehicles, low friction is critical to reduce battery power consumption.

POLYMER/STEEL FRICTION TEST

- A steel ball is pressed against polymer surfaces.
- It is rotated at a range of speeds.
- Torque, and thus friction, is measured.
- The graph shows friction measured with Steel/PA66 and Steel/Delrin contacts.

Shell Gadus E6 2400 shows reduced friction with both polymers when compared to competitors.



CORROSION PROTECTION

Challenge

- Water and humidity trigger rust and corrosion on metal surfaces.

Solution

- Synergies between the thickener, base oil and additives will maintain a stable film protecting against water contamination.
- Rust inhibiting additives will also prevent rust formation if water is able to reach the surface.

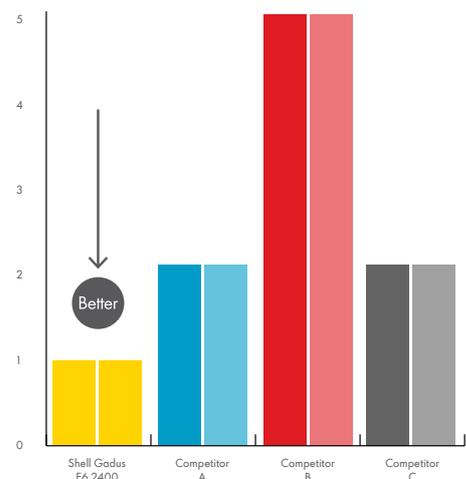
SKF EMCOR TEST

- Two bearings are greased and assembled in housings, about 1/3 filled with 0.5% salt (NaCl) water.
- After a one week stop/start cycle, the bearings are inspected for rust.
- They are rated from 0 to 5 based on the amount of rust.
- 0 or 1 ratings mean no, or virtually no rust.

Shell Gadus E6 2400 achieved an outstanding protection rating of 1 against corrosive salt water. Competitor B showed a rating of 5, indicating there was rust on more than 10% of the surface.

CORROSION PROTECTION EMCOR, 0.5% NaCl

Rating



ADDITIONAL PERFORMANCE BENEFITS

Extreme temperature environments

- Shell Gadus E6 2400's combination of novel thickener and advanced base fluid keeps oil separation under control at high temperatures, preventing severe hardening of the grease due to oil loss and excess thickener.
- Shell Gadus E6 2400 also benefits from low temperatures as well while not compromising on its high temperature performance.

LEAKAGE PREVENTION

Challenge

- The main cause of leakage is softening of the grease due to shear instability.
- Poor greases can have a very low viscosity and become almost liquid like. As a result, these greases can leak into car interiors and stop working.

Solution

- Good stable grease keeps its structure for longer periods.

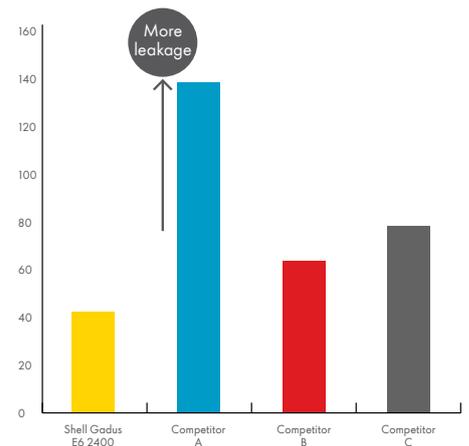
ROLL STABILITY TEST FOR SHEAR STABILITY

- Grease is rolled in a cylinder for 50 hours at 80°C.
- After the test its consistency (stiffness) is tested.
- This is compared with the value before the test.
- A larger difference means the grease becomes thinner.

Shell Gadus E6 2400 stayed much stiffer after shearing compared to competitors. Competitor A became almost a liquid.

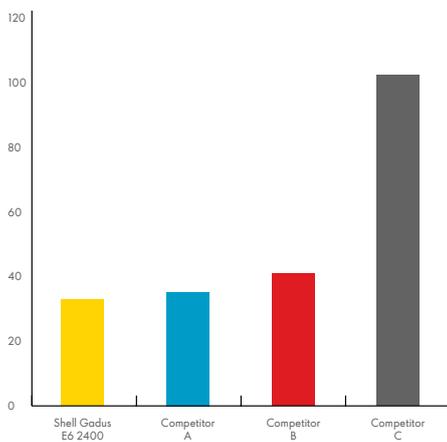
LEAKAGE TENDENCY SOFTENING AFTER SHEAR

Penetration change, mm/10



STARTING TORQUE AT -40°C

Millinewton metres, mNm



EXCEPTIONAL LOW TEMPERATURE USE

Challenge

- During extremely low temperatures, greases can become very stiff and won't flow properly. This will lead to parts not functioning.

Solution

- A good grease is made of components which keep it working optimally at very low temperatures.

LOW TEMPERATURE TORQUE TEST

- A bearing is filled with test grease and is cooled to -40°C.
- The torque needed to make it start rotating is measured.
- Lower results mean better performance at arctic temperatures.

Shell Gadus E6 2400 needed the lowest torque and showed best low temperature performance when compared to competitors.

LACK OF UNPLEASANT ODOUR

Challenge

- Effective grease components may have distinct but unpleasant odours.

Solution

- A perfect blend of grease will result in odours no longer detectable.
- Managing the manufacturing process well as it could affect the final odour of the grease.

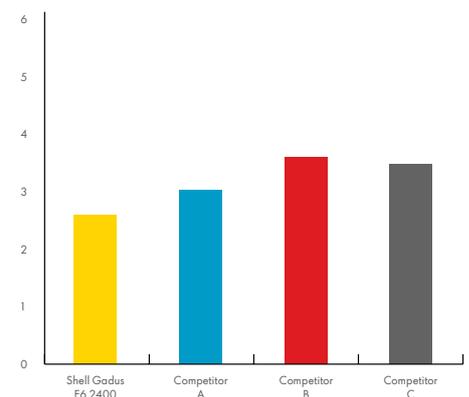
VDA 270 ODOUR TEST

- An independent test to rate the odour of greases that is similar to other odour-sensitive industries such as food and cosmetics.

Shell Gadus E6 2400 rated 2.5 on a 1 (imperceptible) to 6 (intolerable) scale.

ODOUR RATING - >3 IS "DISTURBING"

Rating



CONTACT US

To find out more about Shell Lubricant Solutions for the General Manufacturing industry, contact the Shell team in your market.

All data shown is derived from tests in laboratories of Shell Lubricant Solutions or partners using accepted standard methods.

Note: this is real data from testing a representative batch of Shell Gadus E6 2400. Test data from other batches could show small variations.

