

Product INFORMATION



RENEP CGLP

Newly developed slideway oils for machine tools

Description

The quality of machined components depends heavily on the accurate feed and accurate positioning provided by machine tool slideways with slideway oils playing an important role. Slideway oils must provide a stable, adhesive lubricating film in the presence of metalworking fluids especially in micro-feed situations and when pressure is high. Good lubrication eliminates chattering and thus ripples on the surface of components caused by stick-slip. **RENEP CGLP** oils were developed together with the Tribological Laboratory at the University of Darmstadt and the Laboratory for Tribology and Sliding Technologies (SKC-Technik). Carefully selected base oils and matched additives guarantee almost friction-free movement at the lubrication points. Special attention during development was also paid to compatibility with the water-miscible cutting fluids used in machine tools. Anti-corrosion agents and aging (oxidation) inhibitors are effective at relatively low temperatures (working temperature = room temperature). EP and anti-wear additives guarantee long machine life and exceptionally good operational reliability.

The selected additive combinations create separating layers, which have a low internal shear strength. Furthermore, polar surface-active substances form a stable, adhesive lubricating film. This reduces friction when movement starts, lowers the initial current consumption and optimises the efficiency of the machine tool. To reduce the power consumption during slideway start-ups and feed situations, special attention must be paid to the lubricant between the sliding elements. Important parameters for the selection of the most suitable slideway oil are the cutting fluid, the slideway bearing materials and the geometry of the lubrication grooves. The lubrication intervals must be matched to the machining operation and the design of the machine. Apart from the classic cast-steel, steel-cast and steel-plastic slideway bearings, there is an increasing trend towards linear guides in machine tools. The **RENEP CGLP** series of products are also recommended for these machine elements. Moreover, **RENEP CGLP 68** can also be used as a DIN 51 524-2, HLP 68 hydraulic oil. This product can thus perform the functions of lubricant and a hydraulic oil.

The most important features are:

Stable lubricating film, low coefficient of friction, avoidance of stick-slip.

Stage 4: Contains an oil, emulsion and an intermediate phase, or an oil phase and an intermediate phase of > 30% volume.

Stage 5: Contains an emulsion and an intermediate phase.

Stage 6: Shows no demulsifying, i.e. the intermediate phase remains fully intact.

Stage 1 and 2 indicate that the cutting fluid – slideway oil combination displays “good demulsifying properties”.

Demulsification behaviour of slideways oils and cutting fluids – DIN 51 599 (modified)

Test description:

DIN 51 599 originally served to test the demulsifying properties of hydraulic and/or lubricating oils in oil-water mixtures. It can be applied to all lubricating oils which come into contact with water and which should not form a stable emulsion. Demulsification according to this test measures the time required for an oil-water mixture to separate.

The test requires specific quantities of the oil to be tested and water to be thoroughly mixed. The time needed for the mixture to separate begins when all agitation ends. The modification to cover slideway oil-cutting fluid combinations is performed with these fluids.

Sample quantity: 39.5 ml of oil
(for viscosity > 95mm²/s at 40°C)
39.5 ml of cutting fluid
(at the concentration used)

Temperature: Low viscosity oils up to 95mm²/s:
54°C or room temperature.
High viscosity oils greater than
95mm²/s: 82°C.

Test duration: 15 minutes – to reach temperature
5 minutes – stirring or agitation.
Every 5 minutes for 1 hour –
monitoring results.

The evaluation is based on the volume of the separated

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The **RENEP CGLP** series of oils contain surface-active substances, which improve the coefficient of friction. Stick-slip at the smallest of feed and at the highest loads is effectively avoided. Various laboratory test were performed to evaluate the sliding performance at slow feed and high loads. The SKC-Technik inclined tribometer test revealed very low friction coefficients. For the bearing material combination GG 25/SKC 3, the friction coefficient of **RENEP CGLP 68** was 0.085 and 0.064 for **RENEP CGLP 220**. The static and dynamic coefficients of **RENEP CGLP** slideway oils were determined on the University of Darmstadt's tribotester. The low coefficients measured guarantee reliable and almost "friction-free" operation of machine tools.

The FUCHS "Sliding Friction Apparatus" was used to evaluate the performance of **RENEP CGLP** slideway oils in boundary friction conditions, which are influenced by different cutting fluids and material combinations. No stick-slip occurred in the presence of high loads and water-miscible cutting fluids.

Good EP properties and excellent protection against wear

Apart from surface-active polar substances, **RENEP CGLP** oils contain chemically active agents, which start working at room temperatures. These additive systems perform at high loads and even when the bearing is almost dry, thus protecting slideways from wear and seizure. The often very thin lubricating film effectively protects sliding components from wear. Even if the oil feed is interrupted, chemically active layers protect the slideways from micro-welding and seizure.

Excellent corrosion protection for steel and non-ferrous metals

During the development of **RENEP CGLP** slideways oils, special emphasis was placed on good corrosion protection. Even when water-miscible cutting fluids are used, **no corrosion occurs on the slideways. The danger of corrosion in the form of black discoloration is also minimised.**

Good demulsification, optimum compatibility with water-miscible cutting fluids

Difficulties often arise when water-miscible cutting fluids mix with slideway oils. The lubricating film can be flushed off. The mixture of water-miscible cutting fluid and slideway oil can also alter the tribological characteristics of the lubricant. The result is an increase in the coefficient of friction and the current consumed by drive motors increases considerably. Mixtures of water-miscible cutting fluids and slideway oil can cause lacquering and the formation of deposits. These undesirable by-

- Oil phase (mostly slightly cloudy)
- Cutting fluid phase
- Emulsion mixture phase

measured at 5 minutes intervals, set out in a table. The evaluation is made in line with DIN 51 848-1 (Test fields, Repeatability and Comparability). Ideally, full separation should occur within 1 hour.

The modified DIN 51 599 procedure is considered by R&D engineers to be the most important test for the development of slideway oils. All **RENEP CGLP** oils are compatible with all FUCHS cutting fluids. They all display excellent demulsifying properties and good friction coefficients when in mixtures.

The **RENEP CGLP** oils were developed with the relevant technical application requirements of slideway oils in mind. **RENEP CGLP** slideway oils were supplied to all leading machine tool and component manufacturers for testing and evaluation. The oils not just met but in many cases surpassed the corresponding requirements.

No Characteristics



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products often lead to slideway jamming and seizure.

To avoid such difficulties, slideway oils and cutting fluids should have good demulsification properties, which are evaluated by a series of laboratory tests.

Demulsification behaviour of slideway oils and cutting fluids (SKC-Technik Test)

Test description:

8 ml of oil and then 2 ml of cutting fluid are poured into a 10 ml test tube. The concentration of the cutting fluid should be the manufacturer's recommended value for milling, as a rule, between 3 and 5 %. The test tube is sealed and vigorously shaken before being intensively mixed by placing on a foam rubber covered vibrating plate. The vibration time should be 30 seconds for VG 68 oils and 60 seconds for VG 220 oils. The test tube must not be horizontal to the vibrating plate but somewhat inclined to ensure that both phases remain well mixed. The resulting mixture is visually evaluated after 1 hour, 1 day and after 7 days.

- Stage 1: "Very good demulsification", ie. both phases are completely separated.
- Stage 2: Almost complete separation with no intermediate phase.
- Stage 3: Contains an oil and an intermediate phase.