

SKF Grease Test Rigs



SKF has a long history in grease testing and since the early sixties has developed grease test rigs for a lot of different test procedures, mainly for lubricants in bearing applications.

Lubricant is needed to separate the rolling elements from the raceways in order to prevent damage from (micro) slip. The ideal separating medium is liquid and therefore able to accommodate shear with low frictional losses, while also replenishing the bearing surfaces (self-healing action). Lubricating grease is widely used for its consistency, which makes it easy to use; it will not easily leak out, and it provides some sealing action. Grease protects against corrosion and lowers friction values, compared with oil lubrication, provided that grease with a good quality and filling rate is applied. The most important grease parameters for bearing applications are lifetime, noise level,

corrosion behaviour and the grease properties under different conditions.

The SKF Condition Monitoring Centre in Steyr/Austria, has developed a wide range of equipment for different grease testing methods.

- Dynamic behaviour
- Grease noise
- Corrosion inhibiting properties
- Mechanical stability

Developments are accomplished in close cooperation with the lubrication and tribology experts from SKF ERC, the SKF Engineering & Research Centre based in the Netherlands.



SKF Grease Test Rig R0F+

Lubricating greases that are developed for high temperature or high speed bearing applications, or for a combination of both, must live up to their promises.

The problem, however, is to objectively verify achievements. Previous test methods gave inadequate results. SKF has hence developed its own grease testing machine in order to accurately evaluate the most suitable grease performance characteristics for its high quality bearings.

The SKF Grease Test Rig R0F+ is a further development of the R0F. The R0F+ can be used as a reference for grease life, re-lubrication intervals or as a research tool for grease lifetime testing. The R0F+ goes beyond "standard grease life testing". The rig is a highly efficient tool in grease lubrication research thanks to its flexibility in varying load, speed, temperature and bearing type. We are thus able to offer a wide range of different tools for different ball and roller bearing types. The purpose of the test is to measure the ability of grease to lubricate at various speeds, various temperatures and various loads.

Due to the wide range of axial and radial loads and the freely definable testing temperature the R0F+ offers top flexibility for test sequences. The SKF R0F+ software records all parameters for further investigation.



SKF Grease Test Rig R0F+
LFF 47B

SKF Grease Test Rig RHF 1

Increasing industrial demands on lubrication greases for high-speed and high-temperature applications on rolling bearings represent a tremendous challenge for grease manufacturers. Lubricating greases developed for these kinds of applications should live up to their promises.

Current test methods are not flexible enough to allow tests to be conducted under variable conditions with respect to speed, load and temperature, or while simulating the customer's application. This is why SKF has developed its own grease testing machine for determining the best suited grease to ensure the best possible performance for SKF high-quality bearings.

The SKF Grease Test Rig RHF 1 is a grease lifetime tester capable to test the grease at high speeds up to 75 000 rpm, high temperatures and different axial loads.



SKF Grease Test Rig RHF 1
LFH 47A

SKF Grease Test Rig BeQuiet+

As underlined by SKF's life theory, the use of clean lubricants for rolling bearings is essential for ensuring a long bearing life. In lubrication with grease, many factors can affect the degree of cleanliness during operation, but clean grease will always be required for both the initial lubrication as well as for re-lubrication.

Verifying that the required cleanliness level and lubrication conditions are fulfilled requires a rigorous testing system and the SKF Grease Test Rig BeQuiet+ makes it possible to assess lubricant quality with regard to cleanliness and damping characteristics.

The measurement procedure of the BeQuiet+ has been laid down in international standards, such as ISO standard 15242 and ANSI/ABMA standard 13-1987. These standards define suitable frequency bands and other boundary conditions for noise quality evaluation of greases.

The BeQuiet+ measurement method stands out for its unique testing procedure and degree of automation. The full automatic procedure consists of repetitive lubricant dosing to the test bearing and recording of the vibration level and peaks.

The BeQuiet+ supports also testings according to the MGG 11 standard, for existing test rigs SKF can offer a software upgrade package.



SKF Grease Test Rig BeQuiet+
MVZ 22A

SKF Grease Test Rig EMCOR

To maximise bearing running hours it is very important to prevent the bearing from corrosion.

As most bearings are exposed to humidity during outdoor use or temperature fluctuations between day and night, water or condensed humidity may cause bearing corrosion. A good-quality grease should protect bearings from corrosion in extreme situations. In order to be able to distinguish good rust-protective greases from poor greases and recommend the best-quality grease for its high-quality bearings, many years ago SKF developed the SKF Grease Test Rig EMCOR. The purpose of the test is to measure the ability of grease to protect bearings against corrosion even in contact with water. Greases undergo dynamic tests, i.e. while bearings are running and standing. Even the thin oil film left in the contact zone of rollers and raceways when the bearings are standing still must be able to protect the bearings against corrosion.

The results are different levels of corrosion. This test method complies with the international ISO 11007, ASTM D6138, Germany DIN 51802, Great Britain BS 2000 pt 220 (IP 220), Sweden SIS 155130 and France NFT 60-135.

In addition to the EMCOR standard test, there is equipment available for an advanced wash-out test.



SKF Grease Test Rig EMCOR
LFB 30B

SKF Grease Test Rig V2F

Lubricating greases have to be mechanically stable, i.e. when a bearing arrangement containing grease is subjected to vibrations, the grease must not soften to such an extent that the grease leaks out from the housing.

A good-quality grease will be resistant to mechanical forces of this kind. In order to be able to recommend mechanically stable greases to its bearing customers, SKF has developed the SKF Grease Test Rig V2F. The V2F was initially developed to test greases for railway companies to make sure that there no leakage from the axle boxes occurred when train wagons were subjected to regular shocks upon passing rail track joints. Leakage might occur because the grease in the vicinity of the bearing could fall into the bearing due to regular vibrations.

The test is standardized in SS 3653, CEN/TC 256/SC2/WG12 (part of EN 12081) and EN 14865-2.



SKF Grease Test Rig V2F
LFG 220A

SKF Grease Test Rig R2F

The SKF Grease Test Rig R2F can be simply described as a shaft, driven by an electric motor, and equipped with two test bearings in their respective housings. To simulate actual operating conditions, the bearings are run under load, the speed may be varied and heat can be applied.

The purpose of the standard R2F test is to assess the high temperature performance lubricating ability for grease, simulating in particular the conditions in larger bearings in housing arrangements.

Grease performance is evaluated by measuring the wear of the rollers and the cage. In this test significant wear will only occur as a consequence of the inability of the grease to maintain a lubricant film in the rolling and sliding contact during the full test period. After several running tests at varying temperatures it will be possible to determine the maximum permissible service temperature at which the grease can safely be used in a rolling bearing under similar conditions. This service temperature will then be defined as the high temperature performance limit of the test grease.

The SKF Grease Test Rig R2F rig is standardized in Germany according to DIN 51 806.



SKF Grease Test Rig R2F
LFA 60D

SKF Grease Test Rig RST

SKF Grease Test Rig RST is used for shear stability tests on lubricating greases. The device simulates the effect of squeezing grease between the rollers and the outer ring raceway of roller bearings. Each test cylinder contains a heavy roller and is filled with a certain quantity of the sample grease.

The RST allows up to four test cylinders to be used simultaneously. The test cylinder rests horizontally upon a set of driving and guide wheels which rotate the cylinders. The test method provides an indication of the shear stability of the lubricating greases by testing the change in worked penetrations after two hours in the roll-stability tester. This apparatus conforms to ASTM D1831 and related specifications.

Different options are available for the RST, e.g. adjustable rotation speed, different cylinders with different materials and additional fan housing for tests under ambient temperature. The SKF Grease Test Rig RST conforms to ASTM D1831 and related specifications.



SKF Grease Test Rig RST
LFI 60A

Lubrication test unit

MEL-7000 is a portable electronic instrument able to measure electrical capacitance between the inner and outer ring of a bearing. The capacitance between the inner and outer ring is the sum of series connection of the capacitances formed by the oil films between outer race and ball, ball and inner race.

Thus MEL-7000 is able to give an indication of the lubrication condition of the bearing under test. The measuring system is a ratio measurement of two capacitances in series, fed by an oscillator with constant voltage amplitude and frequency. One is the reference capacitor, the other is the capacitance to be measured, formed by the bearing capacitance of the input cable and parasitic capacitances.

When the capacitance to be measured is equal to the reference capacitance, the voltage ratio is 0,5, thus resulting in an output voltage of half full scale (5 V). When the bearing capacitance increases (very thin film), the output voltage becomes zero. On the other hand, if the film thickness increases, the bearing capacitance decreases to a minimum and the output voltage reaches full scale. In order not to damage the bearing under test by sparking, the voltage applied to the bearing is 90 mV peak-peak maximum.



Lubrication test unit
MEL-7000

Type	Designation	Equipment	Description	Key facts
ROF+	LFF 47B		SKF Grease Test Rig to assess the grease performance at high temperatures and speeds	<ul style="list-style-type: none"> • Test bearings: Various ball and roller bearings • Speed: 5 000 ... 25 000 rpm (ndm >200 000) • Axial load: 100 ... 1 100 N • Radial load: 50 ... 900 N • Temperature: Ambient ... 230 °C • Dimensions: 1 185 × 2 200 × 800 mm
RHF 1	LFH 47A (60 000 rpm) LFH 47B (75 000 rpm)		SKF Grease Test Rig to assess the grease performance at high temperatures and very high speeds	<ul style="list-style-type: none"> • Test bearings: Deep groove ball bearings and angular contact ball bearings • Speed: 5 000 ... 60 000 rpm (75 000 rpm) • Axial load: 50 ... 1 100 N • Temperature: Ambient ... 230 °C • Dimensions: 1 730 × 1 650 × 720 mm
BeQuiet+	MVZ 22A		SKF Grease Test Rig to assess the grease noise in rolling bearings	<ul style="list-style-type: none"> • Test bearings: Special deep groove ball bearing (BY-608/VQ607) • Speed: 1 800 rpm • Axial load: 10 ... 60N (default 30 N) • Dimensions: 1 700 × 1 405 × 650 mm
EMCOR	Standard test: LFB 30B/110 (110 V) LFB 30B/230 (230 V) Wash-out test: LFB 30C/110 (110 V) LFB 30C/230 (230 V)		SKF Grease Test Rig to assess the corrosion inhibiting properties	<ul style="list-style-type: none"> • Test bearings: Special self-aligning ball bearing (1306K/236725) • Speed: 80 rpm • Standardized in DIN 51802, ISO 11007 and IP 220 • Dimensions: 280 × 1 230 × 380 mm
V2F	LFG 220A		SKF Grease Test Rig to assess the mechanical stability of greases necessary to provide resistance to leakage under vibration conditions	<ul style="list-style-type: none"> • Test bearing: Special spherical roller bearing (229750) • Speed: 500 rpm and 1 000 rpm • Standardized in SS 3653: Railways – Rolling bearings or axle boxes – Test of the mechanical stability of greases • Dimensions: 2 012 × 1 030 × 1 779 mm
R2F	LFA 60D		SKF Grease Test Rig to assess the mechanical stability of lubricating greases especially for bearings in railway applications	<ul style="list-style-type: none"> • Test bearings: Special spherical roller bearing (22312 EWMA/C3P VQ420) • Speed: 1 500 rpm, 2 500 rpm • Temperature: Ambient ... 160 °C • Standardized in DIN 51 806 • Dimensions: 1 315 × 880 × 1 045 mm
RST	LFI 60A		SKF Grease Test Rig to assess the shear stability of lubricating greases	<ul style="list-style-type: none"> • Speed: 165 rpm • Temperature: Ambient ... 200 °C • Dimensions: 730 × 700 × 690 mm
Lubrication Test Unit	MEL-7000		MEL-7000 is a portable electronic instrument able to measure electrical capacitance between the inner and outer ring of a bearing	<ul style="list-style-type: none"> • For all bearing types • Battery power: 10–32 Veff AC, 50/60 Hz or 10–46 V DCD • Dimensions: 220 × 355 × 225 mm

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