

SKF Grease Test Rig RHF 1

Test rig to assess grease performance high temperatures and speeds

LFH 47A/B



General description

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 offer what they promise. The challenge is to check that these promises are fulfilled. Current test methods do not have the flexibility 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 developed its own grease testing machine in order to determine the most suitable grease to ensure the best possible performance for SKF high-quality bearings. The SKF Grease Test Rig RHF 1 is now available on the market.

Purpose of the test

The purpose of the test is to measure the ability of a grease to lubricate at various high speeds, temperatures and axial loads. The grease quality is measured by recording the number of running hours before the grease ceases to lubricate and, as a consequence, the bearings fail. The longer the number of running hours in the test unit, the more effectively the grease lubricates under those conditions. In this way the maximum operating speed, temperature and load for a particular grease can be determined.



Machine description



- 1** Evaluation electronics

2 Keyboard with touch pad (mouse, behind cover)
- 3** Electrical cabinet

4 Driving spindle

5 Pneumatic and lubricating cabinet
- 6** Test unit

7 Cooling aggregate for driving spindle

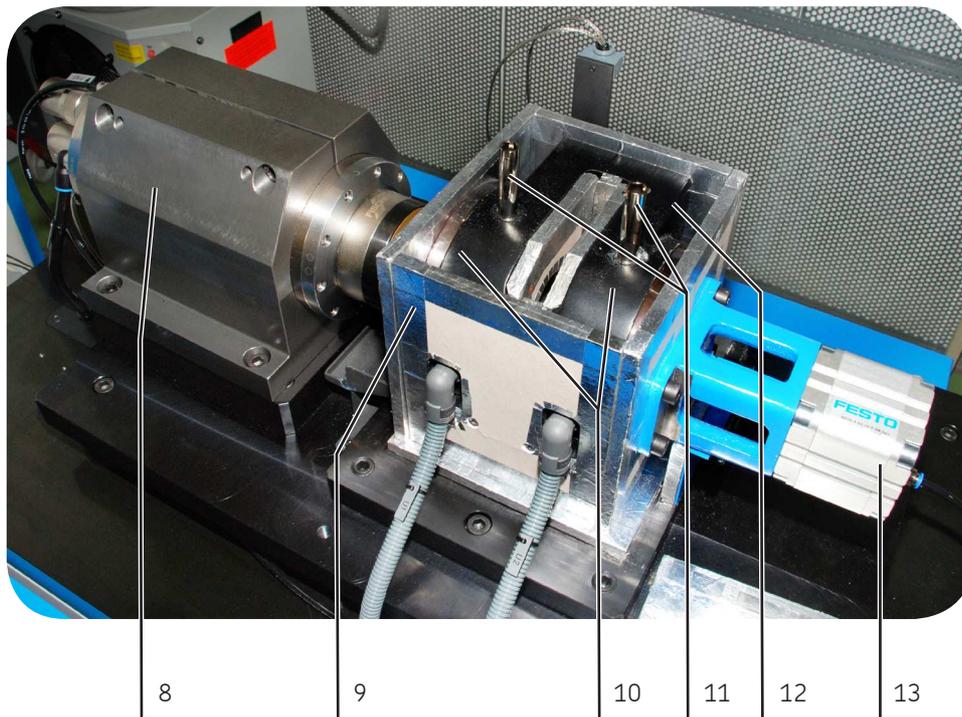
The SKF Grease Test Rig RHF 1 essentially consists of three parts – a mechanical test unit, an electrical cabinet which incorporates the PC, the keyboard and the screen, all control functions for the test mechanics and an external cooling system supporting the high-speed spindle drive.

All important parts of the machine can be accessed from the front side. Various test bearings can be used (see technical data).

For the shielded bearings, the shields are delivered separately. The high-precision shaft is rotated by a frequency-controlled high-speed spindle drive. The cast iron

housing contains two heating elements. Each half of the housing has a temperature probe to check and regulate the temperature.

Machine description

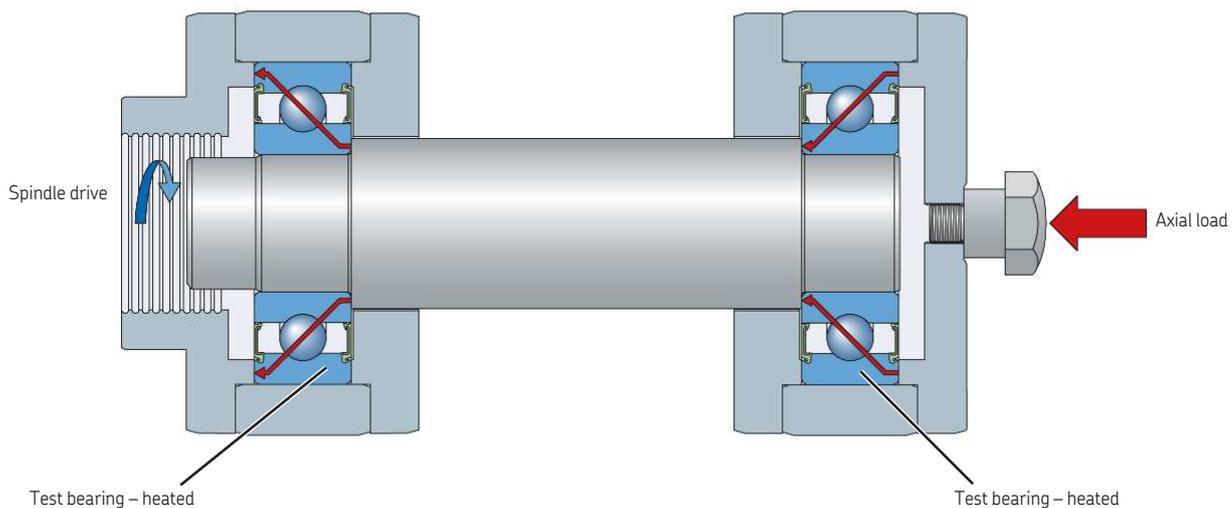


8 High-speed driving spindle
9 Heat insulation

10 Heating elements (inside the housing)
11 Bores for temperature probes

12 Cast-iron housing
13 Pneumatic cylinder for axial load

Test load flow inside the test unit



Main components

- Cast-iron housing with integrated heating system and temperature insulation. The housing contains two test bearings mounted on a high-precision shaft.
- High-speed frequency motor drive.
- Base frame including motor drive lubrication system and pneumatics for applying axial load.
- External cooling system for motor drive.
- Electrical cabinet with integrated PC and machine control systems.

Main features

- Advanced flexibility
- Customer application test possible
- Free programmable test parameters
- Frequent monitoring of test parameters
- Display of test results
- Data storable
- Windows 7-based software

Test procedure

The bearings are mounted on a highprecision shaft in the housing and the whole mechanical test rig is assembled. The bearings are slowly brought up to the speed and temperature at which the real test starts. These tests can be long life grease tests or short term grease tests to evaluate the condition of the test grease after a certain test temperature is reached. Each bearing is individually temperature-controlled by means of a thermocouple. When the test temperature increases beyond preprogrammed limits, the unit will be switched off automatically (Sudden Death Test).

The test bearings are standard bearings with separate shields or without shields. They are washed, rinsed, dried and lubricated with a specified quantity of test grease.

Test results

In the SKF Grease Test Rig RHF 1, greases are checked for their grease life in high-speed and/or high-temperature applications. The longer the running time, the better the quality of the grease. Two test bearings run as a pair in the cast-iron housing. Consequently, when one of the bearings fails due to temperature rise or seizing, both bearings will stop running, although the other bearing may still be in excellent condition (Sudden Death Test Strategy).

Test output parameters

- Visual inspection of grease and bearing condition after dismounting.
- Temperature of the test bearings (this is the criterion for end of test).
- Power consumption of high-frequency spindle motor.
- Test duration.
- Power consumption of temperature controller (duty cycle) for each test bearing.

Applicability to service conditions

From the result obtained, a calculation can be made as to how bearings will behave in practice. Also the important relubrication interval can be calculated.

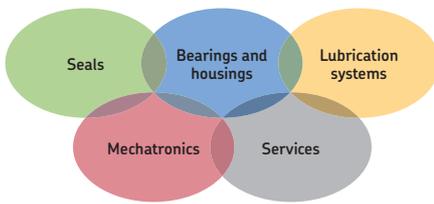
As lubrication intervals are linked to bearing failure, precise knowledge of the grease behaviour is of extreme importance.

Test cost

The test bearings are normal production bearings. They are the only component that has to be renewed for each test. The assembly and disassembly of the test bearings can be done quickly and adequately provided the right tooling is used. The machine controls itself and no personnel involvement is necessary during the test, which means labour costs are minimal.

Technical specifications

- Mechanics
 - Spindle speed:
 - LFH 47A 5 000 to 60 000 rpm
 - LFH 47B 5 000 to 75 000 rpm
 - Test temperature: Up to 230 °C
 - Axial test load: 50 to 1 100 N/bearing
 - Drive: high-speed spindle
 - Paint Blue RAL 5015, white RAL 9002
- Electronics
 - Operating system: Windows 7
 - Evaluation system: Industrial panel PC
 - Control system: Siemens PLC S7-300
 - Interface to PLC: PROFI-Bus
- Test specifications
 - Test bearings
 - For pure high-speed grease testing (synthetic cage):
7005CE/HCP4A (7007CE/HCP4A optionally)
 - For high-temperature/speed testing (metal cage):
62042Z/C3S2VM104, 2Z, shields delivered separately in the package
 - Grease filling grades
 - For pure high-speed grease testing: 10 to 15% of the free volume 0,71 to 1,06 cm³
 - For high-temperature/speed testing: 20 to 30% of the free volume, 1,4 g corresponds to 30% when the specific weight is in a range of 0,9 to 1,0 g/cm³
 - Test parameter
 - For pure high-speed grease testing:
Speed rating for grease acc. SKF 50 000 r/min
= 1,8 mill. $n \times D_m$
Maximum spindle speed possible 60 000 r/min
= 2,16 mill. $n \times D_m$
Maximum spindle speed possible 75 000 r/min
= 2,7 mill. $n \times D_m$
Axial load 50 to 350 N load applied pneumatically
Ambient temperature
Speeds and loads freely selectable and changeable during test duration
 - For high-temperature/speed testing:
Test bearing with shields or without shields
Speed rating for grease acc. SKF 32 000 r/min
= 1,072 mill. $n \times D_m$
Maximum spindle speed possible 60 000 r/min
= 2,01 mill. $n \times D_m$
Maximum spindle speed possible 75 000 r/min
= 2,7 mill. $n \times D_m$
Axial load 50 ... 1 100 N load applied pneumatically
Temperature up to 230 °C
Speeds, temperature and loads freely selectable and changeable during test duration
- Dimensions and weights
 - Dimensions (H × W × D): Mechanics and electrical cabinet
1 730 × 1 650 × 720 mm (68.1 × 65.1 × 28.3 in.)
 - Weight:
 - Mechanics and cooling aggregate: Approx. 610 kg (1 345 lbs)
 - Electric cabinet: Approx. 285 kg (589 lbs)
- Requirements
 - Electrical system: See rating plate
 - 3 × 400 V/50 Hz/30 kVA
 - 3 × 480 V/60 Hz/30 kVA
 - Valve control voltage: 24 V =
 - Pneumatic system:
Air pressure 6 bar (87 psi) at least, clean and dry air



The Power of Knowledge Engineering

Combining products, people, and application-specific knowledge, SKF delivers innovative solutions to equipment manufacturers and production facilities in every major industry worldwide. Having expertise in multiple competence areas supports SKF Life Cycle Management, a proven approach to improving equipment reliability, optimizing operational and energy efficiency and reducing total cost of ownership.

These competence areas include bearings and units, seals, lubrication systems, mechatronics, and a wide range of services, from 3-D computer modelling to cloud-based condition monitoring and asset management services.

SKF's global footprint provides SKF customers with uniform quality standards and worldwide product availability. Our local presence provides direct access to the experience, knowledge and ingenuity of SKF people.

Technical specifications subject to change without notice.

For more information on your specific application, please contact our engineers at QT – Steyr.

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