

Grease Performance at High Temperatures and Speeds



Grease Test Rig RHF 1

- Advanced flexibility
- Customer application test possible
- Free programmable test parameters
- Frequent monitoring of test parameters
- Windows 7-based software
- 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.

The 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.

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.

The bearings are mounted on a high precision 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.

In the 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 Method

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.

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 re-lubrication interval can be calculated. As lubrication intervals are linked to bearing failure, precise knowledge of the grease behavior is of extreme importance.

Specifications

Spindle Speed

- K94800/K94890: 60,000 RPM
- K94801/K94891: 75,000 RPM

Test temperature: Up to 230 °C

Axial test load: 50 to 1 100 N/bearing

Drive: high-speed spindle

Operating system: Windows 7

Evaluation system: Industrial panel PC

Test bearings

- For pure high-speed grease testing (synthetic cage): 7005
- For high-temperature/speed testing (metal cage): 6204 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 parameters

- For pure high-speed grease testing:
 - Speed rating for grease acc. 50,000 RPM
 - = 1,8 mill. $n \times Dm$
 - Maximum spindle speed possible 60,000 RPM
 - = 2,16 mill. $n \times Dm$
 - Maximum spindle speed possible 75,000 RPM
 - = 2,7 mill. $n \times Dm$
 - 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. 32,000 RPM
 - = 1,072 mill. $n \times Dm$
 - Maximum spindle speed possible 60,000 RPM
 - = 2,01 mill. $n \times Dm$
 - Maximum spindle speed possible 75,000 RPM
 - = 2,7 mill. $n \times Dm$
 - 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

Requirements

- Electrical
 - 400V 50Hz 30 kVA 3 Phase
 - 480V 60Hz 30 kVA 3 Phase
- Valve Control Voltage: 24 V
- Pneumatic System
 - Air Pressure 6 bar (87 psi) at least, clean, dry air

Dimensions wxdxh,in.(cm)

65.1 x 28.3 x 68.1 (165x72x173)

Net Weight: 1,934 lbs (895kg)

Ordering Information

Catalog No.

K94800	Grease Test Rig RHF 1, 60,000 RPM 400V 50Hz, 3 Phase
K94890	Grease Test Rig RHF 1, 60,000 RPM 480V 60Hz, 3 Phase
K94801	Grease Test Rig RHF 1, 75,000 RPM 400V 50Hz, 3 Phase
K94891	Grease Test Rig RHF 1, 75,000 RPM 480V 60Hz, 3 Phase

Accessories

K94800-1	Test Setup for Bearing Type 6204 <i>For 60,000 RPM Model</i>
K94800-2	Test Setup for Bearing Type 7005 <i>For 60,000 RPM Model</i>
K94801-1	Test Setup for Bearing Type 6204 <i>For 75,000 RPM Model</i>
K94801-2	Test Setup for Bearing Type 7005 <i>For 75,000 RPM Model</i>
K94800-3	Test Bearing 6204
K94800-4	Test Bearing 7005
K94800-5	Shield Pressing Tool for Type 6204 Test Bearing



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