



Testing Method for low-Temperature Torque of Ball Bearing Grease

KES T – L091

(EST.) 1989 – 06 – 07

Contents

1. Scope of Application
 2. Significance
 3. Method Summery
 4. Definitions
 5. Equipment
 6. Material
 7. Operation
 8. Evaluation Standard Result
 9. Evaluation Standard
- Additional Rule



1. Scope of Application

This standard determines the degree that disturbs the rotation of ball bearing due to grease exposes to low temperature, or torque measuring method.

2. Significance

This method has been improving for using the grease that has very low torque at $-54\text{ }^{\circ}\text{C}$.

You shall be cautious about that this is not applied for another grease, speed, and temperature.

3. Method Summery

No. 204 Open Ball Bearing shall be perfectly filled with the testing grease, and each surface shall be maintained clean.

Surrounding temperature shall be lower than $-54\text{ }^{\circ}\text{C}$ and maintain it for 2 hours. Here, the bearing shall be fixed.

While the inertia that would not rotate, that is linked with the outside ring last is decided, rotate the ring inside the ball bearing with $1 \pm 0.05\text{ rpm}$.

This inertia that would not rotate is proportional with the torque.

The torque when it starts rotating and the torque after rotating for 60 minutes shall be decided.

4. Significance

(1) Low Temperature Torque

The torque in gcm, while the inside ring is rotating with $1 \pm 0.05\text{ rpm}$ at $-54\text{ }^{\circ}\text{C}$, and the grease for the test shall be needed for the inertia that would not rotate, of the ring, outside open ball bearing, size of No 204.

(2) Starting Torque

The maximum torque measured when it starts.

(3) Rotating Torque

The average torque after it rotates for 60 minutes.

5. Equipment

5.1 Figure 1 explains the proper torque test equipment.

The explanation for these parts are on 5.1.1 to 5.1.5.

5.1.1 Low Temperature Box

Use a box whose inside volume is 1 ft³, kept warm well. Its inside temperature can be controlled in +0.5 °C ~ -54 °C, and maintain the temperature.

The baffle prevents the bearing to be used from contacting colder air than the room temperature.

As figure 2 shows, this drive mechanism can be installed from the outside, or it can be installed in the box directly.

When installing the drive outside, measure the temperature on the spot on the test axis' surface between the box wall and the test bearing.

5.1.2 Housing

Use the load disk made by SAE 4140 steel low temperature torque housing and figure 3.

The weight of housing shall be determined as 454 ± 3 g

5.1.3 Drive Assembly

For the test axis, the test bearing shall be inserted on the shoulder that is not higher than the bearing's inside race shoulder.

With a spacer washer and a test bearing whose diameters are same, at least

1.6 mm thick spacer washer shall be used in order to fix the inside ring of test bearing on the 1 rpm axis.

5.1.4 Torque Measuring Equipment

It consists of the power system set by 1 ~ 4.6 kg, 0 ~ 4450 N on 203 mm surface.

5.1.5 Grease Cup

5.1.6 Spindle

6. Materials

6.1 Test Bearing

(1) Bearing Characteristics

It is No. 204 Size Open Ball Bearing (20 BC 02 JOAFBMA Code) processed with a tolerance ABEC-3, whose distance between ball and outside wall of the bearing is 0.008 ~ 0.018 mm, and that has two steel case that can be separated from 8 of 7.9 mm ball.

(2) Bearing Choice

After it is washed and dried, drop about 5 drops of oil with 135 ~ 150 SUS at 210 °F viscosity on the bearing.

While a light pressure is being applied to the axis and emissive direction, and while it is rotating between the indicators, there shall not be any observed roughness.

As using a sophisticated power system, decide the running torque at the room temperature.

And, record the average of maximum running torque peak point.

The average shall not exceed 20 g · cm and any peak shall not exceed 25 g · cm.

If this torque exceeds the value, you shall wash it and do this test again.