

Mechanical Stability

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The ability of a grease not to change in consistency after mechanical working, also referred to as shear stability or mechanical stability. This can be determined by several tests including the extended worked penetration, roll stability and SKF V2F test.

Extended penetration

The grease penetration worker is used to apply the standard shear (60 double strokes) to a grease sample the penetration is then measured. The same worker then applies 100,000 double strokes further shear to the same grease after which the penetration is again measured. The difference between the original penetration and the value measured is reported as the change in penetration in mm/10 (sometimes only the penetration after the test is used). SKF has shown that the extended penetration test can only distinguish greases with very poor stability.

Roll stability test

The change in the structure of a grease (amount of softening or hardening) can also be evaluated by filling a cylinder with a pre-specified quantity of grease. A roller is placed inside the cylinder and the complete unit is rotated for 2 hours at room temperature in accordance with ASTM D 1831. SKF modified the test procedure to reflect the application conditions under which the grease is used to either 72 or 100 hours at a test temperature of 80 or 100 °C. At the end of the test the cylinder is allowed to cool to room temperature and the penetration of the grease is measured. The difference between the original penetration and the value measured is reported as the change in penetration in mm/10.

SKF V2F test

The candidate grease is tested for mechanical stability using the following procedure. The test rig consists of a railway axlebox subjected to vibration shocks of 1 Hz from a bouncing hammer producing an acceleration level between 12-15 g. The test is run at two different speeds, 500 and 1,000 rpm. If the grease which leaks from the housing through the labyrinth seal which is collected in a tray after 72 hours at 500 rpm weighs less than 50 grams the test is continued for a further 72 hours at 1,000 rpm. If the total amount of grease leakage after both tests does not exceed 150 grams then a rating of 'M' is given. If the grease only fulfils the first part of the test (72 hours at 500 rpm) but fails the second stage a rating of 'm' is given. If the grease leakage after 72 hours at 500 rpm is greater than 50 grams then it is rated 'fail'.

SKF V2F outcome (rating of observed grease leakage):

- "m" max. 50 g leakage after 72 hrs / 500 rpm
- "M" max. 150 g leakage after a total of 144 hrs
- "fail" > 50 g leakage after 72 hrs / 500 rpm

Meaning of the test result:

- "m" grease suitable for arrangements subjected to moderate vibrations
- "M" grease suitable for arrangements subjected to strong vibrations

Shear strength

Shear strength is the maximum shear stress that is possible to transmit through a grease without the onset of grease flow. Grease being a semi-solid material can transmit a shear stress also with the shear strain rate zero. The shear strain rate zero grease can be kept on different surfaces of bearings and housings. This is an important parameter when pumping greases through pipes in a centralised lubricating system.

Shear stability

The ability of a lubricating grease to resist the changes in consistency during mechanical working. The working may be a result of either laboratory tests or in actual service. This is also called mechanical stability.

