



Bearing lubricants

“All for one and one for all...”

Bearings, Lubricants & Seals...they are often considered as three separate components however really they should be thought of as one.

In any given application they are each only as reliable as the other two.

If the bearing isn't able to perform at the given load, speed, temperature, the result is bearing failure.

If the seals fail the lubricant does not stay in the bearing, the result is bearing failure.

Often however the lubricant is the 'weakest link' if it is not suitable for the Speed, Load, Temperature, or any other environmental factor, the result is the same...bearing failure.



Correct bearing lubrication is critical

How do we avoid the lubricant being the 'weakest link' ? Well first of all we need to analyse what we expect of the lubricant by asking some simple questions...

- What speed is the bearing to be used at, speed factor ?
- What loads act on the bearing?
- What is the maximum and minimum temperature that the bearing will experience?
- What is the nominal operating temperature?
- Are there any chemicals, solvents, acids etc or other environments that the lubricant will have to withstand?
- Re-lubrication, is this possible? If so how often and what is the life requirement?

Once these questions have been answered we need to decide the appropriate lubricant to give the expected life within these conditions.

Grease, oil or Dry Film Lubricant?

For most bearings we are looking at oil or grease lubrication. A grease is simply a thickened oil, the thickener just holds the oil like a sponge and releases it under pressure as required.

We need to look at the speed factor (DN) for the bearing, this is calculated by Speed factor = ID of the bearing in mm X the speed in rpm. i.e. a 30mm ID bearing with a rotational speed of 1000 rpm will have a speed factor of 30,000.

Usually oil lubrication is needed where speeds are very high (Speed factor is > 800,000) or where the temperature of the bearing is so great that there is a need for a cooling element from the oil.

In most other applications with ball and roller bearings, grease is the preferred lubricant, it stays in place and provided it can cope with the mechanical and environmental aspects can offer 'lifetime lubrication'.

With grease we also need to consider the fill quantity carefully, too much grease can typically cause more failures than too little.



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So what fill is required? Well simply speaking a faster bearing requires less grease than a slow moving bearing. For speed factor values of less than 50,000 where the bearings are unshielded i.e. in a housing with a grease nipple, 100% fill of the free space is best. From Speeds of DN 50 –350,000 a fill of 50-80% is better. For higher speed bearings a fill of between 15-30% is normal. If the bearings are shielded however then 25-40% fill is typically enough depending upon duty.

These are only rough guidelines and consultation with either the lubricant or bearing supplier is recommended.



Grease fill is dependent upon speed

We now need an oil (base oil if a grease) which will have the correct viscosity at the nominal working temperature to give an ideal film thickness between the working surfaces at the given operating speed. In conjunction with this we must also consider the loads on the bearing. We also must consider the maximum and minimum temperatures that the application will experience.

From this we can select the optimum oil (base

oil) for the application. If a lubricant which will not withstand the maximum temperature is selected the lubricant will rapidly evaporate & degrade, if a product does not have a low enough pour point (the temperature at which it will no longer pour) then at low temperatures the torque in the bearing will be too high.



Seal compatibility must be considered

We also need to ensure that the lubricant that is chosen is compatible with all materials within the bearing, cage and the seals. Seals also must be stable and function properly throughout the required temperature range and within the given environment.

In examining the environment that the bearing will experience any element that may degrade or effect the performance of the lubricant, bearing or seals should be considered. For example, if chemicals or solvents are involved then both special seal materials and lubricants would be required to protect the bearing.

This factsheet should only be used as a basic guide to understanding the principles involved with choosing a suitable bearing lubricant.

IKV Group have a full range of bearing lubricants specifically developed to cope with the most demanding applications and conditions. Please also read our other downloadable fact-sheets on greases, oils and how to choose a lubricant—www.ikvlubricants.com. Please [contact us](#) should you require assistance or advice for your particular industry or application.