

TECHNICAL INSIGHT

A PUBLICATION OF NSK EUROPE

'Low-friction' – NSK bearings increase energy efficiency

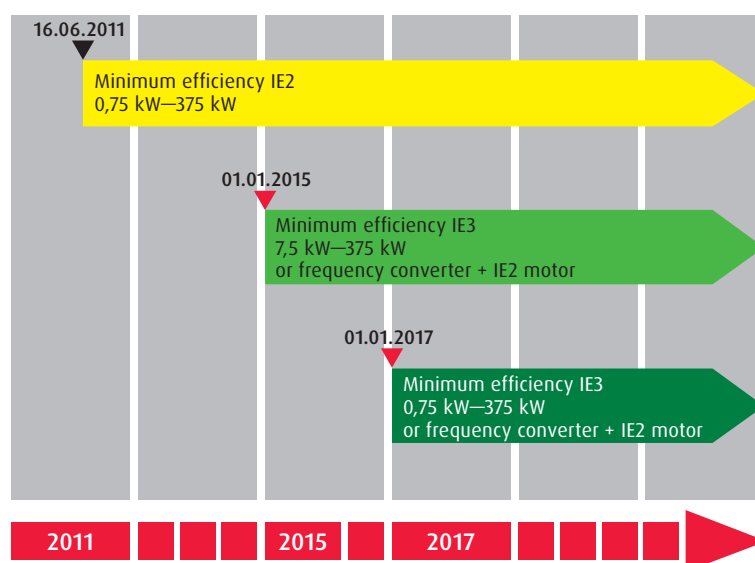
The selection of rolling bearings for electric motors plays a crucial role in achieving energy efficiency classes. Furthermore, the quality measures taken by NSK from the design to the finished bearing help reduce running noises and operating temperatures to a minimum and to achieve a longer service life.

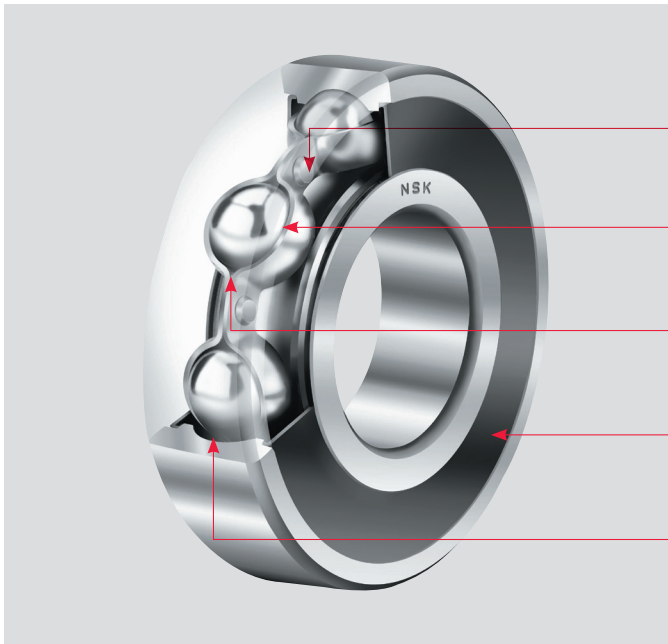
Energy efficiency – responsibility for the environment

Due to the growing pressure of environmental regulations around the world with the goal of lowering emissions, industry is increasingly looking for solutions that increase efficiency and, at the same time, reduce energy or power consumption. The EFF efficiency classes introduced voluntarily in 1998 have since been replaced by efficiency classes set in the standard.

- › 2011: All three-phase AC motors in the power range 0.75 to 375 kW must correspond to the efficiency level IE2
- › 2015: All motors in the power range 7.5 to 375 kW must correspond to the efficiency level IE3 or, alternatively, to IE2 if they have frequency converters
- › 2017: The regulations are to be extended to cover motors in the power range 0.75 to 375 kW

Friction is influenced by a large number of parameters. The interplay of a large number of factors can have a positive or a negative effect on the application.





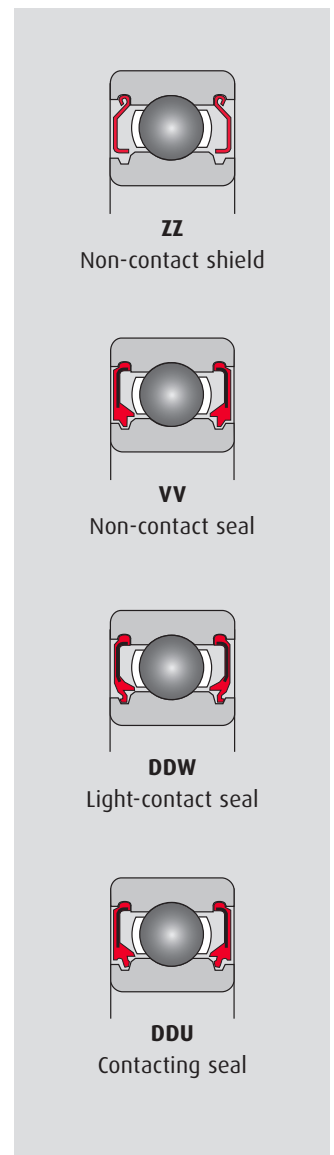
- Fibreglass-reinforced polyamide cage for reduced friction
- High-performance lubricants for reduced torque loss
- Optimised lubricant filling to suit the polyamide cage
- Non-contact sealing concept (ZZ and VV) or special light-contact seal (DDW) for low frictional torques
- Optimised raceway geometry for reduced contact friction and lower operating temperature

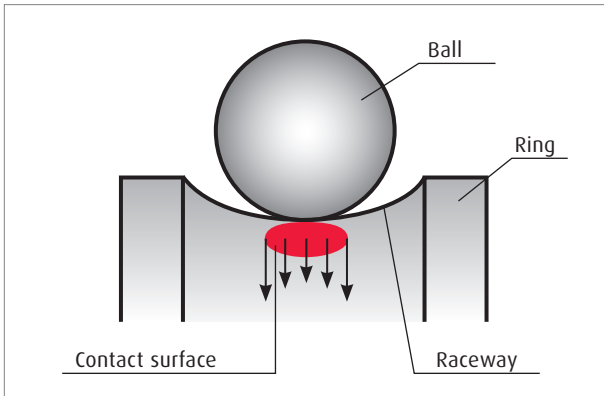
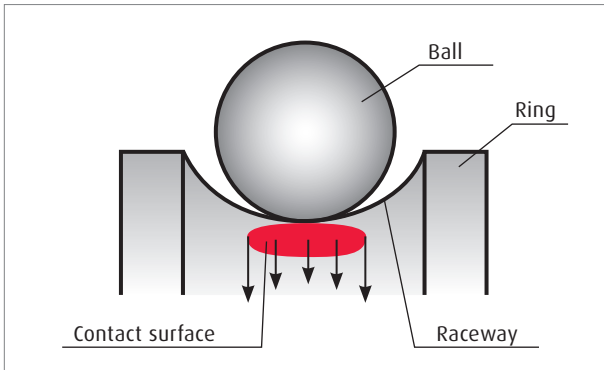
Specially developed sealing concepts

Our shields and contact seals ensure long-term trouble-free operation. The patented labyrinth design not only offers optimum sealing but also ensures low frictional torque. A variety of sealing options are available depending on the requirements of the application. Metal shields are used for high-speed applications to protect against light soiling such as dust. These shields perform exceedingly well over a wide temperature range.

For applications requiring greater protection the advantages of non-contact labyrinth seals become increasingly important. This patented design ensures effective sealing without friction and without raising the operating temperature. It offers better sealing performance than a shield, and, compared to a contacting seal, its non-contact sealing lip reduces the frictional torque of the bearing. This is a huge advantage in applications in which power losses are critical. The suitability for high speeds is comparable to that of shielded bearings.

Rolling bearings with contacting and low-friction seals offer additional protection for heavy-duty applications. Additional special bearings are available for a wide range of bearing sizes.





Custom raceway geometries for demanding applications

Rough bearing raceways impair lubrication and can increase running noises. The raceways of NSK rolling bearings are machined using a specially developed honing process to produce an extremely smooth surface. This allows better lubrication and a longer bearing life. Moreover, NSK offers rolling bearings with a modified internal raceway geometry. Here, the contact surface between the rolling element and the raceway is reduced, resulting in less friction.

Working together with experienced engineers from NSK, this technical design change makes it possible to adhere to loading limits and enables further significant frictional torque reductions to be achieved. The result: extremely silent rolling bearings and a huge improvement in energy efficiency.

The benefits at a glance

Through a combination of polyamide cages, high-performance greases, optimised bearing clearances, special sealing concepts and custom raceway geometries, NSK rolling bearings according to the low-friction concept offer the following advantages:

- › Low frictional torques for greater energy efficiency
- › Lower heat build-up for longer service life