

TECHNICAL INSIGHT

A PUBLICATION OF NSK EUROPE

Limiting speed – Parameters for calculation and use of a correction factor

As soon as a bearing reaches or exceeds its limiting speed – i.e. its empirically established maximum speed – it may no longer be able to operate stably. The limiting speed depends on various factors and can be increased using a correction factor.

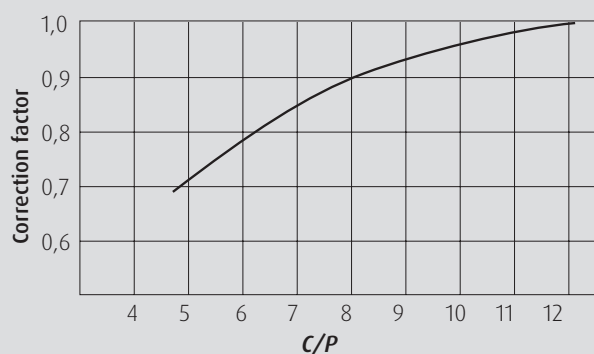
The limiting speeds for bearings with grease and oil lubrication are listed in the product tables. These figures are based on standard bearings which are exposed to normal loads. Conventional oil-bath lubrication is assumed for bearings with oil lubrication.

Some types of lubrication are not suitable for high speeds. If the rotational speed is more than 70% of the limiting speed listed in the tables, an oil or grease suitable for high speeds must be used.

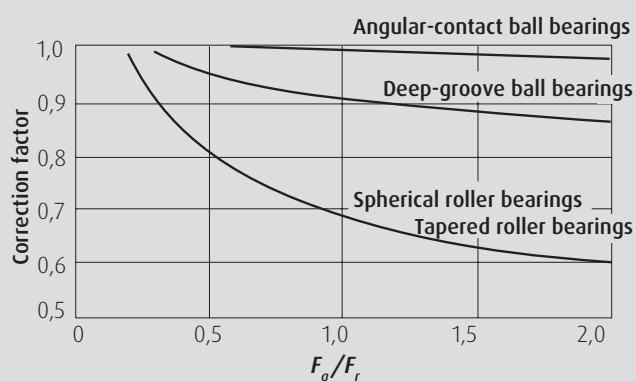
Conditions and influencing factors

The limiting speed is affected by various conditions and influencing factors, including:

- › Bearing type and size
- › Degree of accuracy
- › Internal play
- › Cage shape and material
- › Lubrication
- › Load
- › Heat dissipation
- › Bearing environment



Relationship between the correction factor and the load ratio



Relationship between the correction factor and the load ratio for various bearing types

Using a correction factor to adjust the limiting speed

If the above-mentioned conditions have been checked and taken into account, the limiting speed quoted in the product tables must be increased using a correction factor. To do this, the limiting speed is multiplied by a correction factor specific to the bearing in question. The correction factor can only be used if:

- a) the bearing load (P) is a maximum of 8% higher than the dynamic load rating (C) or
- b) the axial load (F_a) does not exceed the radial load (F_r) by more than 20%.

Limiting speeds and correction factors only serve as a guide.

*We recommend you contact us in the case of high-speed operations.

*Correction factor for various bearings for use in high-speed operations	
Bearing types	Correction factor
Cylindrical roller bearings (single row)	2
Needle roller bearings (except wide series)	2
Tapered roller bearings	2
Spherical roller bearings	1.5
Deep-groove ball bearings	2.5
Angular-contact ball bearings (except matched bearings)	1.5