

Market review

Cylindrical roller bearings for freight car axleboxes

International standards

Cylindrical roller bearings for freight cars have to fulfil the requirements of several international standards like:

- EN 12080 Railway applications – Axleboxes – Rolling bearings
- EN 12082 Railway applications – Axleboxes – Performance testing

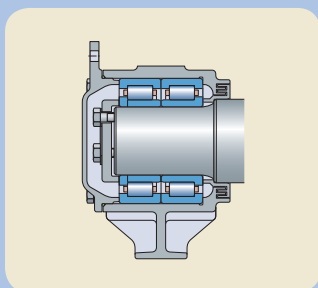
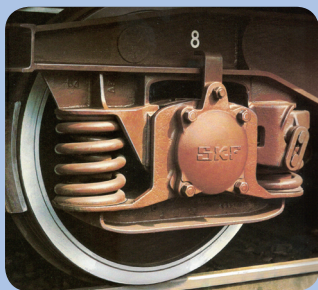
as well the German standard DIN 5412-11, where not only boundary dimensions are standardized, but also the internal design, including radial and axial clearance.

Micro geometry

In addition to the requirements in these standards, SKF has set further requirements on micro geometry. The aim is to design and manufacture raceways in such a way that radial and axial loads in the roller contact zones are accommodated in an optimal way.

Hardness

There is a balanced hardness of the rollers compared to the inner and outer rings as to provide lowest contact stresses, leading to extended service life.



Customer benefits

- significant reduced life cycle cost
- best reliability in operation
- unique performance
- high quality level
- optimized micro geometry
- optimized material hardening composition



Competitor A

The service life is reduced due to deviations from the reference:

Radial contact

- radial profile deviation factor: 4,6
- roughness deviation factor: 1,3

Axial contact

- flange angle deviation factor: > 6
- roughness deviation factor: 2,2

Material hardness

- The too high hardness of the rollers compared to the inner ring raceways has a negative effect on the contact stresses, leading to a reduced service life.

Competitor B

The service life is reduced due to deviations from the reference:

Radial contact

- radial profile deviation factor: 2
- roughness deviation factor: 1,8

Axial contact

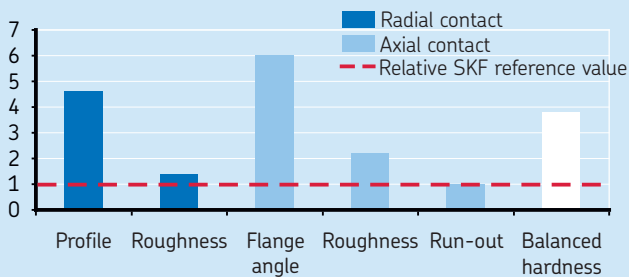
- flange angle deviation factor: 1,8
- roughness deviation factor: 1,8
- roller face run-out deviation factor: 6

Other

- the bearing markings lead to increased fretting corrosion

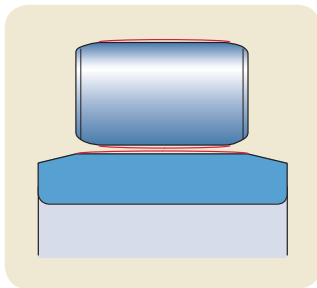
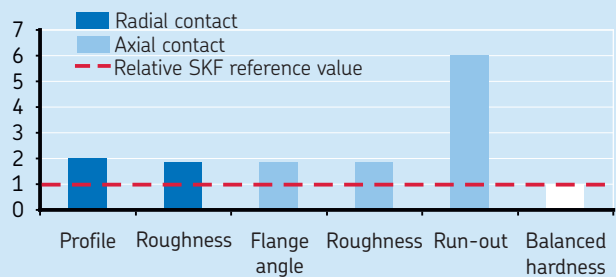
Relevant performance criteria

deviation factors : competitor A/SKF (reference)

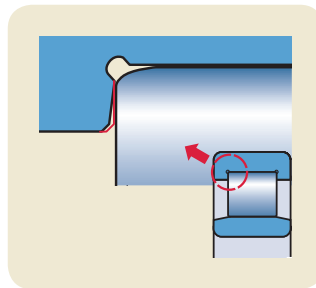


Relevant performance criteria

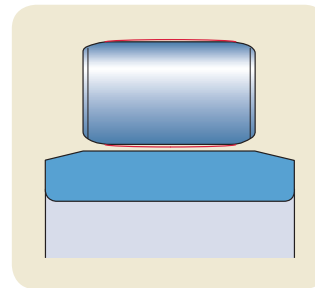
deviation factors: competitor B/SKF (reference)



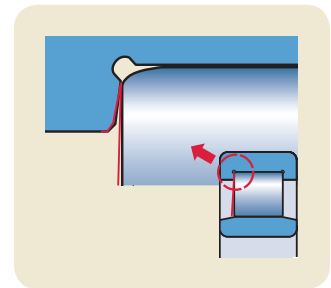
- *partial high convex crowned raceways profile corresponds to a factor of up to 6 compared to SKF values*
- *convex roller profile height corresponds to a factor of up to 3 compared to SKF values*
- *radial profile deviation factor: 4,6 for both features*



- *partial non-acceptable high negative flange angle -3µm/mm of the rings*
- *high roughness of the raceway*
- *both features increase the friction and operating temperature with the need for shorter service intervals as a consequence*



- *convex roller profile height corresponds to a factor of up to 3,3 compared to SKF values. This influences the contact stresses leading to a reduced service life.*



- *high run-out of the roller faces corresponds to a factor of up to 6 compared to SKF values*
- *partial large positive flange angle corresponds to a factor of up to 1,6 compared to SKF values*