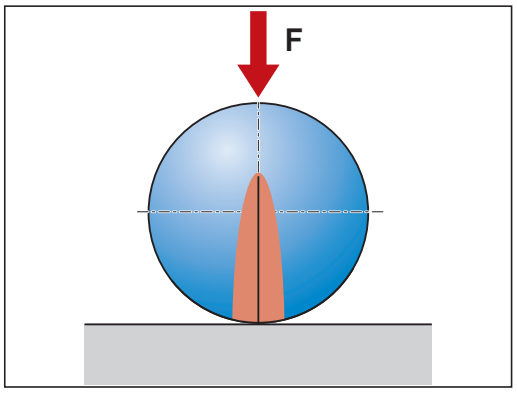
2.3 Rolling contact

2.3.1 Rolling contact of balls and rollers

2.3.1.2 Ball contact conformity

Running tracks with contact conformity

In the case of rolling ball contact with planar running tracks, the high surface pressure and the absence of guided movement have an unfavorable effect. For these reasons, profiled running tracks offering contact conformity are used. This increases the contact area and reduces the surface pressure accordingly. Higher load-bearing capabilities can therefore be achieved. This also serves to guide the movement of the rolling element.



Stress distribution for a contact area without conformity

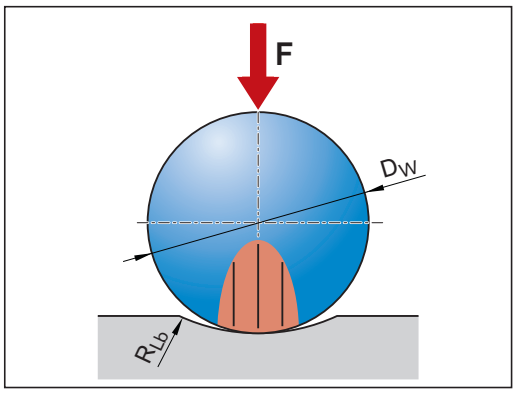
Definition of conformity

Conformity is the ratio of the running track radius to the ball diameter, expressed as a percentage:

$$\kappa = \frac{R_{Lb}}{D_W} \cdot 100\% \qquad (2\text{-}1)$$

κ	=	conformity	(%)
R_{Lb}	=	running track radius	(mm)
D_W	=	ball diameter	(mm)

A ball on a running track designed for contact conformity will deflect significantly less than a comparable ball on a planar running track. Also, where there is conformity between the ball and the track, the ball will have a longer life than a ball with point contact because of the larger contact area and the resulting distribution of the forces acting on it.



Stress distribution for a contact area with conformity

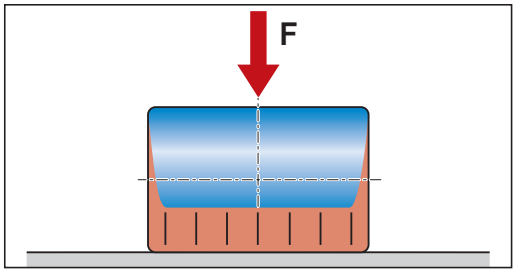
2.3.1.3 Logarithmic and cylindrical roller profiles

Logarithmic profile

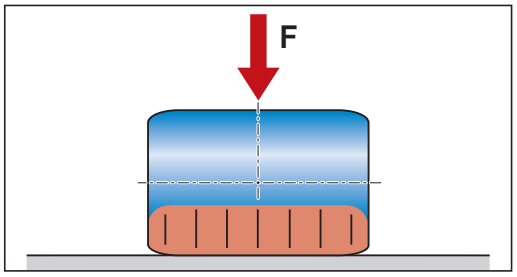
Rolling contact with rollers differs from that with balls. A distinction is made between rollers with cylindrical and logarithmic profiles. Both forms are approximately comparable in terms of their elastic deflection behavior.
Rollers with logarithmic profiles, however, offer further advantages:

- More even distribution of forces
- Lower peak stresses at the edges
- Correspondingly less edge contact

This results in longer life than with cylindrical rollers. Rexroth therefore uses rollers with logarithmic profiles.



Stress distribution for cylindrical roller profiles



Stress distribution for logarithmic roller profiles