

FAG



Suspension Tube Roller Bearings for Rail Vehicles

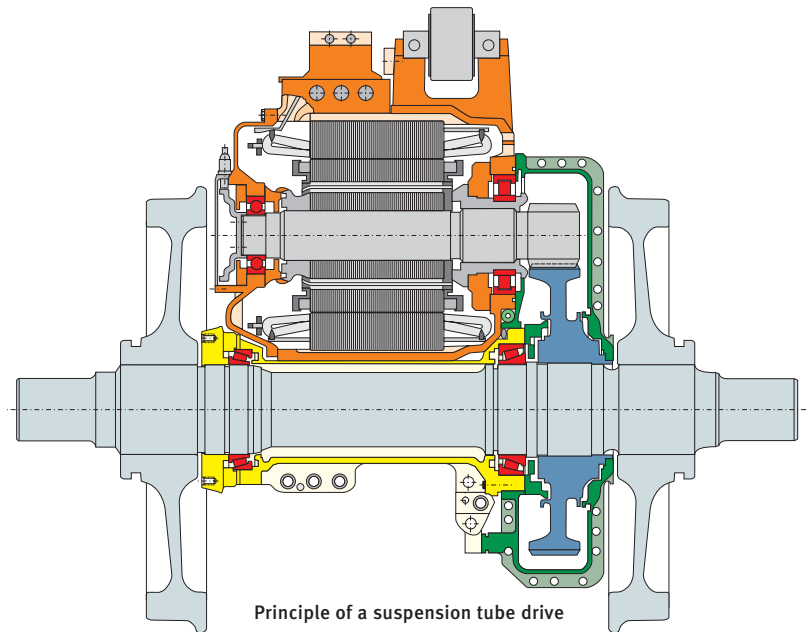
Technical Product Information

SCHAEFFLER GROUP
INDUSTRIAL

Suspension Tube Drive · Suspension Tube Roller Bearings

Suspension tube drive

The suspension tube drive is a single-axle drive for railway motive power units that is characterized by its simple design. It is one of the oldest and at the same time most cost-efficient electric drive systems for rail vehicles. The traction motor is mounted transversely to the driving direction and suspended on one side in most cases via an elastic torque support on the bogie. On the opposite side, the traction motor is supported unsprung on the axlebox shaft of the driven wheelset with its transmission housing via suspension tube roller bearings. Today's three-phase motors with significantly reduced masses allow for economical operation at a maximum speed of up to approx. 140 km/h.



Traction motor Image: Siemens

Suspension tube roller bearings

Suspension tube roller bearings are primarily subjected to the following loads:

- Tooth forces of the spur gear
- Own mass of the traction motor
- Reaction force from the torque support

Additionally, dynamic loads usually occurring during operation of rail vehicles, such as bounces on staggered rail joints and vibrations, reduce the bearings' operating life.

At the beginning of the 1950s, the previously used plain bearings prone to wear were replaced with robust rolling bearings. Tapered roller bearings, cylindrical roller bearings and spherical roller bearings have proved most reliable in this type of application.

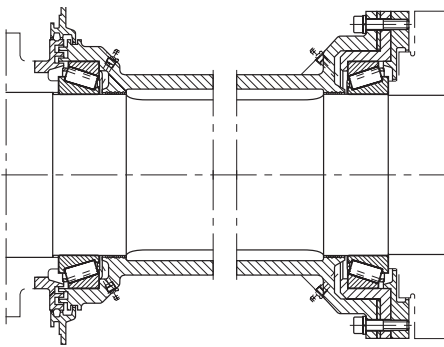


Mounting of a suspension tube roller bearing

Bearing Designs

Tapered roller bearings

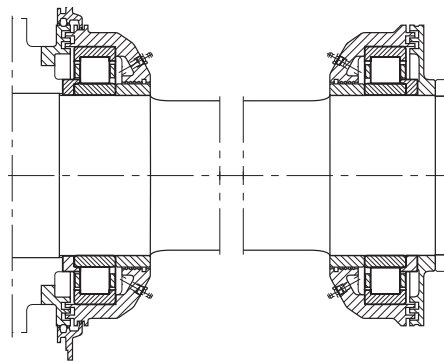
Suspension tube bearing arrangements with tapered roller bearings can support particularly high radial and axial forces. The bearings are fitted as an adjusted bearing arrangement, usually in an O arrangement. The axial clearance is adjusted during mounting, which allows for very close axial guidance of the teeth. Special tapered roller bearings with reinforced sheet steel cages are used to support the high loads caused by vibrations and bounces caused by misaligned rail joints. Special designs, e.g. with current insulation or flanged outer rings, can be provided on request.



Suspension tube roller bearing arrangement with tapered roller bearings (O arrangement)

Cylindrical roller bearings

Cylindrical roller bearings can support very high radial forces, but are only partly suitable for supporting axial forces. This bearing design is therefore the preferred option for spur gears. Cylindrical roller bearings are fitted in locating/non-locating bearing arrangements as well as in floating bearing arrangements. A special advantage is that they can be easily mounted and dismantled. Due to the high shock and vibratory loads involved, single piece solid brass cages are predominantly used.

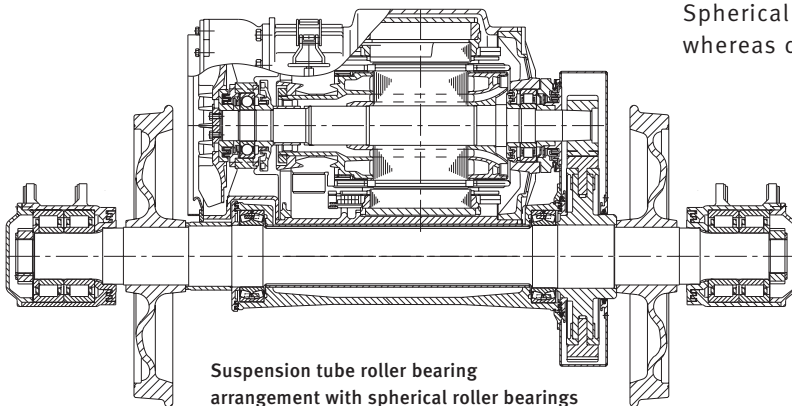


Suspension tube roller bearing arrangement with cylindrical roller bearings

Spherical roller bearings

Spherical roller bearings are the preferred option if high shaft deflections are likely to occur. Furthermore, they can easily support axial forces originating from helical gears even at larger helix angles.

Spherical roller bearings are fitted in locating/non-locating bearing arrangements as well as in floating bearing arrangements. Here, single piece solid brass cages are used as a standard. Spherical roller bearings are relatively easy to mount, whereas dismantling is usually more difficult.



Schaeffler KG

Business Unit Rail

Georg-Schäfer-Strasse 30
97421 Schweinfurt (Germany)

Telefon +49 9721 91-3998

Telefax +49 9721 91-3788

E-Mail rail_transport@schaeffler.com

www.fag.com www.ina.com

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