Feature

The internal design of SLB Track rollers is the same as in single row or double row angular contact ball bearings. The units can carry axial loads in both directions and, due to the thickness of the outer ring, large radial loads. The standard product are produced from high quality bearing steel, with a hardness of 58 to 62 HRC. Some types are also available in stainless steel (440C) with hardness ＞ 58 HRC. The track rollers contained in this catalogue are produced with standard tolerances (ISO 492) and standard clearance (CN). The track rollers are produced in two distinct families. Cylindrical or crowned outer ring and profiled outer ring.

1. Track rollers with cylindrical or crowned outer ring

These track rollers are available in single and double row design.
They are available with straight cylindrical OD or crowned profile OD. The crowned OD is used to reduce the edge stresses caused by possible misalignment errors. The cylindrical OD can provide increased support due to the longer contact profile.

There products are used typically on flat surfaces.
Some of the most common applications are:
-transfer rolls
-idler rollers
-Support rollers
-Straightening rolls

1.1 Types

1.1.1 Track rollers LR 2..NPP, LR 2..RRU

These single row ball track rollers are available in two different versions.

-LR2..NPP: cylindrical OD, with contact seals protected by a metal shield.
-LR2..RRU: crowned OD with contact seals protected by a metal shield, inner ring with increased width to allow additional lubricant storage.
Track rollers series **LR 2..**are supplied grease filled. The lithium soap grease, according to DIN 51825 K3N-30.

1.1.2 Track rollers LR 52-53..NPPU,LR 52-53..KDD

These are double rows angular contact ball track rollers.
Due to their internal design, they can carry axial loads of large magnitude. They are available in two versions:

-LR52-53..NPPU: crowned OD, contact seals protected by a metal shield.
-LR52-53..KDD: cylindrical OD, with metal shields.
Track rollers series **LR 52..**are supplied grease filled. The lithium soap grease, according to DIN 51825 K3N-30.

2. Track rollers with profiled outer ring

The track rollers with profiled outer ring are basically double rows angular contact ball bearings with a reinforced and profiled outer ring. The outer ring profile allows the units to operate on round shafts or other type of profiled raceways. The outer profile can have three different designs;

- Track rollers with Gothic arch groove - type R
- Track rollers with "V" shaped groove - type RV

- Track rollers with "W" profile - type RM

Type RV and RW can be supplied with the pertinent mounting hardware.
The largest portion of these prouduct are used as linear guides.

2.1 Types

2.1.1 Track rollers R, mounting bolts and studs RC/RE

The track rollers series R can be used on round shafts with diameter from 4 mm to 50 mm. The contact between track roller gothic arch groove profile and shaft is on two points. This allows the units to carry loads in both axial and radial direction. The track rollers are available with either shields **ZZ** or contact seals **2RS.** The units are supplied with lifetime grease lubrication (DIN 51825 K3N-30). The size with an outside diameter 52 mm or greater have a lubrication hole in the inner ring. To pre vent mixing of greases with differen t characteristics, please insure to perform the lubrication of the units with lubricants that have the same characteristics as the grease used at the factory. Mounting bolts are available in both eccentric **RE** and concentric **RC** versions. The eccentric bolts **RE** and **RE..A1** allow the adiustment of the operating clearance. Bolts of series **RE..A1** and **RC..A1** have facilities that enable re lubrication of the track rollers. The mounting bolts of series **RC** hare supplied with the pertinent washer, while the one of series RE have both washer and nut. The units **RC..A1** and **RE..A1** also incorporate the grease fiting and its relative cover plug.

2.1.2 Track rollers RV

The track rollers **RV** have a groove machined in the outer ring. The groove is **"V"** shaped with an included angle of 120 degrees. These units are predominantly used on shafts with diameters from 7 to 20 MM. The contact between track roller and shafts is on two points. In special cases, the units can run on profiled ways. The units are supplied with non contact shields and with lifetime lubrication.

2.1.3 Track rollers with "W" profile, type RM

The track rollers series **RM** have grooves machined in the outer ring of the unit with an included angle of 90 degree. They have been engineered to run on profiled steel elements that have identical shape. They can run on either the internal or the external surfaces of the outer ring.

They are available with either non-contacting shields **ZZ** or contact seals **2RS.** Both versions are supplied with lifetime grease lubrication.

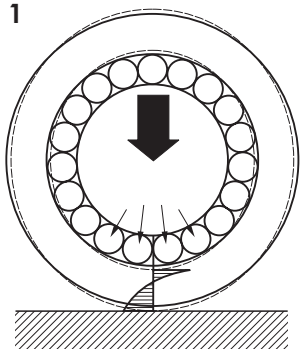
2.1.4 Track rollers with integral stud

These track rollers are supplied with the pertinent eccentric or concentric stud. They are available with cylindrical OD or a profiled outer ring. All three designs (Gothic arch, **"V"** shape or **"W"** shape) are available.

3. Load ratings and life calculation

If the track rollers operate on a flat surface/raceway, the outer ring deforms **(fig.1)**
When compared with a bearing mounted in a suitable housing, track rollers have the following characteristics:
- Modified load distribution
This is accounted for by using the load factors Cw and Cow when calculating the life.
- Alternating bending stress on the outer ring
This is taken into account by the load coefficients Frperm and Fro perm (see dimension tables). The stresses must not exceed the allowable limits.

Fig. 1



3.1 Load ratings and life calculation

The dynamic load rating of the track roller is determined by the fatigue limit of the material. The life of the track roller is defined as the period of use before the appearance of fatigue. The ability of a track roller to carry dynamic loads is statistically derived.

3.1.1 Life calculation

The formula to calculate the nominal life is as follows:

$$L = \left(\frac{CW}{P}\right)^3$$

$$L_h = \frac{833}{H.nosz}\left(\frac{CW}{P}\right)^3$$

$$L_h = \frac{1666}{Vm}\left(\frac{CW}{P}\right)^3$$

L = nominal life in $10^{\wedge}5$ m reached by 90% of a statistically significant number of apparently identical bearing operating under the same loading condition before the onset of metal fatigue.

L_h [h] = nominal life in hours
C_w [N] = Dynamic load rating. Is the load that would yield a nominal life of 10^5 m.
P [N] = equivalent dynamic load
H [m] = stroke
n_{osz} [min^{-1}] = frequency of operation
Vm [m/min] = mean operating velocity

3.1.2 Radial dynamic limit load Fr perm

When selecting the product it is necessary to insure that no loading condition will exceed the allowable load.

4. Static load rating

The static load rating indicates the elastic limit of the material. Exceeding the limit will impair the proper functioning of the unit as well as the accuracy and the noise behavior.

4.1 Static saferty factor

The static safety factor So allows the calculation of the allowable static load that can be applied to the track roller.

$$So = \frac{C_{ow}}{P_{omax}}$$

So = static safety factor
Cow [N] = Static load rating. It is defined as the load that causes a permanent deformation equal to 1/10.000 of the rolling element diameter, at the most stressed point.
Po [N] = equivalent static load

To guarantee the highest accuracy and the lowest noise the static safety factor should be always So>=4.

4.2 Permissible static radial load, For perm

When selecting the product, it must be verified that no operating load will exceed the published limits.

5. FRICTION

5.1 Friction moment

The friction moment depends upon load, speed, bearing type and lubrication method as well as lubricant type.

The accurate assessment of the actual friction moment is quite difficult, due to the multiple parameters.
A quick evaluation can per done using the formula:

$$Mr = \frac{f.F_r\,d_m}{2}$$

Mr [Nmm] = friction moment
f **=** coefficient of friction
dm [mm] **=** bearing pitch diameter (d+D)/2
Fr [N] **=** radial load

Track roller type	f
Single row design	**0.0015 ÷ 0.002**
Double row design	**0.002 ÷ 0.003**

5.2 Rolling friction

The friction of a track roller operating on a raceway is calculated as follows:

$$Fa = \frac{2.(f_r.F_r+M_r)}{D}$$

F_a [N] **=** rolling friction
f_r **=** coefficient of friction at the tire/raceway interface for hardened and steel raceways = 0.05
D [mm] **=** outside diameter of track roller.
F_r [N] **=** radial load
M_r [Nmm] = friction moment

6. Operating temperature

The maximum operating temperature for the track rollers in this catalogue is **120 deg. C.**
Higher operating temperatures may lead to material structural changes that could lead to reduced hardness and subsequent reduction of the load ratings and nominal life as well as uacceptable dimensional changes.