Technical information

Static Load

The maximum static loads of the SN series are defined using the slider length and are listed in the tables of the previous pages. These load capacities are valid for a loading point of forces and moments in the center of the slider. The load capacities are independent of the position of the slider inside the rails. During the static tests the radial load capacity, C_{0rad}, the axial load capacity, C_{0ax}, and moments M_x, M_y and M_z indicate the maximum permissible values of the loads. Higher loads negatively affect the running properties and the mechanical strength. A safety factor, S_0, is used to check the static load, which takes into account the basic parameters of the application and is defined in more detail in the following table:

Safety factor S_0

Neither shocks nor vibrations, smooth and low-frequency reverse, high assembly accuracy, no elastic deformations	1 - 1.5
Normal installation conditions	1.5 - 2
Shocks and vibrations, high frequency reverse, significant elastic deformation	2 - 3.5

The ratio of the actual load to maximum permissible load may be as large as the reciprocal of the accepted safety factor, S_0, at the most.

$$\frac{P_{0rad}}{C_{0rad}} \leq \frac{1}{S_0} \qquad \frac{P_{0ax}}{C_{0ax}} \leq \frac{1}{S_0} \qquad \frac{M_1}{M_x} \leq \frac{1}{S_0} \qquad \frac{M_2}{M_y} \leq \frac{1}{S_0} \qquad \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

The formulas above apply for a single load case. If there are two or more of the described forces simultaneously, the following check must be made:

$$\frac{P_{0rad}}{C_{0rad}} + \frac{P_{0ax}}{C_{0ax}} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

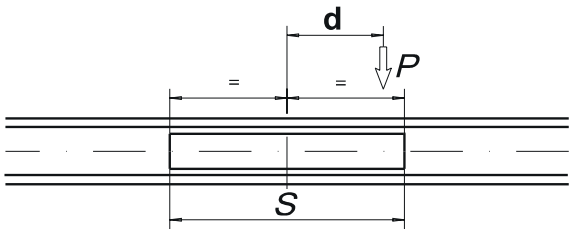
P0rad	= effective radial load
C0rad	= permissible radial load
P0ax	= effective axial load
C0ax	= permissible axial load
M1	= effective moment in the x-direction
Mx	= permissible moment in the x-direction
M2	= effective moment in the y-direction
My	= permissible moment in the y-direction
M3	= effective moment in the z-direction
Mz	= permissible moment in the z-direction

Off-center load P of the slider:

For an off-center load of the slider, the different load distribution on the balls must be accounted for with a reduction of the load capacity C. As shown in the diagram below, this reduction of the distance, d, from the loading point is dependent on the slider center. The value, q, is the position factor, the distance, d, is expressed in fractions of slider length S. The permissible load, P, decreases as follows:

$P = q \cdot C_{0rad}$ for a radial load

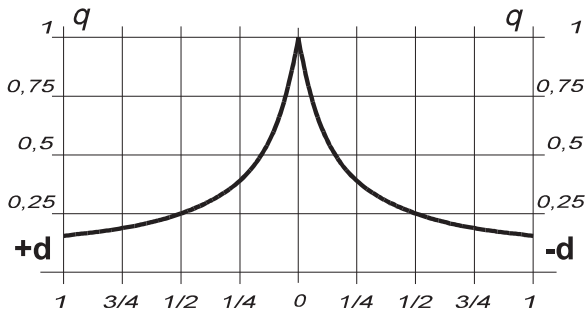
$P = q \cdot C_{0ax}$ for an axial load



For the static load and the service life calculation, P0rad and P0ax must be replaced by the equivalent values calculated as follows:

$P_{0rad} = \frac{P}{q}$ if the external load P acts radially

$P_{0ax} = \frac{P}{q}$ if the external load P acts axially



Service Life

The service life of a linear bearing depends on several factors, such as effective load, operating speed, installation precision, occurring impacts and vibrations, operating temperature, ambient conditions and lubrication. The service life is defined as the time span between initial operation and the first fatigue or wear indications on the raceways. In practice, the end of the service life must be defined as the time of bearing decommissioning due to its destruction or extreme wear of a component. This is taken into account by an application coefficient (fi in the formula below), so the service life consists of:

$$L_{km} = 100 \cdot \left(\frac{C}{W} \cdot \frac{1}{F_i} \right)^3$$

L_{km} = calculated service life (km)
C = dynamic load capacity (N) = C_{0rad}
W = equivalent load (N)
f_i = application coefficient

The stroke factor fh takes into account the higher load of the raceways and rollers during short strokes on the same total length of run.
The corresponding values are taken from the following graph (for strokes longer than 1 m, $f_h = 1$):

No. of sliders	1	2	3	4
fc	1	0.8	0.7	0.63

Application coefficient f_i

Neither impacts nor vibrations, smooth and low-frequency direction change, clean operating conditions, low speed (<0.5 m/s)	1 - 1.5
Slight vibrations, average speeds (between 0.5 and 0.7 m/s) and average direction change	1.5 - 2
Impacts and vibrations, high-frequency direction change, high speeds (>0.7 m/s), very dirty environment	2 - 3.5

If the external load, P, is the same as the dynamic load capacity, C_{0rad}, (which of course must never be exceeded), the service life at ideal operating conditions (fi = 1) amounts to 100 km. Naturally, for a single load P, the following applies: W = P. If several external loads occur simultaneously, the equivalent load is calculated as follows:

$$W = P_{rad} + \left(\frac{P_{ax}}{C_{0ax}} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z}\right) \cdot C_{0rad}$$

Clearance and Preload

The SN series linear bearings are installed with no clearance as standard. For more information, please contact Rollco.

Preload classes		
Increased clearance	No clearance	Increased preload
G_1	Standard	K_1

Coefficient of Friction

With correct lubrication and installation on level and rigid surfaces and sufficient parallelism for rail pairs, the friction value is less than or equal to 0.01. This value can vary depending on the installation situation.

Linear Accuracy

With installation of the rails using all bolts on a perfectly plane support surface with the fixing holes in a straight line, the linear accuracy of the sliders to an external reference results from the following equation:

$$// = \frac{\sqrt{H}}{300} \text{ (mm)} \qquad H = \text{stroke}$$

Speed

The linear bearings of the SN series can be used up to an operating speed of 0.8 m/s (31.5 in/s). With high-frequency direction changes and the resulting high accelerations, as well as with long ball cages, there is a risk of cage creep.

Temperature

The SN series can be used in ambient temperatures from -30 °C to +170 °C (-22 °F to +338 °F). A lithium lubricant for high operating temperatures is recommended for temperatures above +130 °C (+266 °F).

Anticorrosive Protection

The SN series has a standard anticorrosive protection by electrolytic zinc-plating according to ISO 2081.
If increased anticorrosive protection is required, the rails are available chemically nickel-plated and with stainless steel bearing balls.

Numerous application-specific surface treatments are available upon request, e.g., as a nickel-plated design with FDA approval for use in the food industry. For more information please contact us.

Lubrication

Recommended lubrication intervals are heavily dependent upon the ambient conditions. Under normal conditions, lubrication is recommended after 100 km operational performance or after an operating period of 6 months. In critical application cases the interval should be shorter. Please clean the raceways carefully before lubrication. Raceways and spaces of the ball cage are lubricated with a lithium lubricant of average consistency (roller bearing lubricant).

Different lubricants for special applications are available upon request. Example: Lubricant with FDA approval for use in the food industry. For more information please contact us.

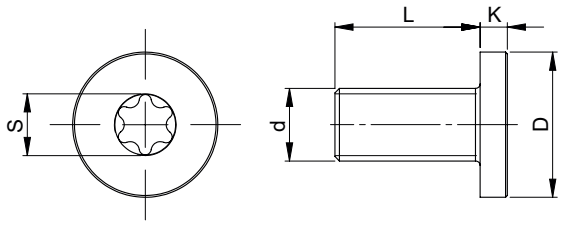
Fixing screws

The rails of the SN series in sizes 22 to 43 mm are fixed with countersunk head screws according to DIN 7991.

Tightening torques of the standard fixing screws to be used.

Property class	Size	Tightening torque (Nm)
10.9	22	4.3
	28	8.5
	35	14.6
	43	34.7
	63	34.7

Screws for size 63:



Size	Screw type	d	D	L	K	S	Tightening torque
			mm				
63	M8 x 20	M8 x 1.25	13	20	5	T40	34.7