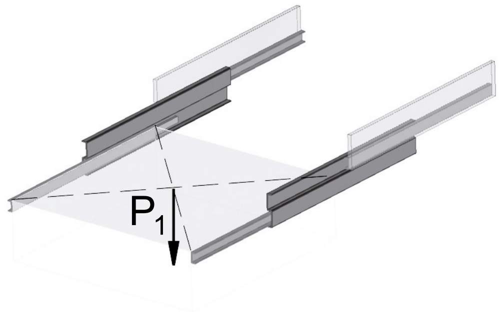
Technical Information

Selection of Telescopic Rail

Selecting the suitable telescopic rail should be done based on the load and the maximum permissible deflection in the extended state. The load capacity of a telescopic rail depends on two factors: the loading capacity of the ballcage and the rigidity of the intermediate element. For mainly short strokes the load capacity is determined by the load-bearing capacity of the ballcage; for average and long strokes it is determined by the rigidity of the intermediate element. Therefore series, which otherwise contain comparable components, are also suited for different load capacities.

Load Capacities

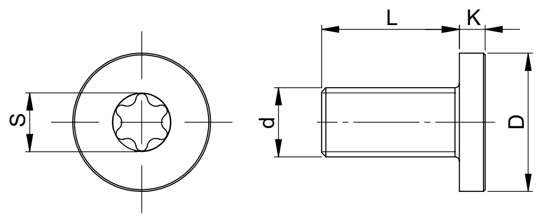
The values in the load capacity tables of the corresponding series give the maximum permissible loading of a telescopic rail in the centre of the movable rail in the completely extended state. All load capacity data is based on one telescopic rail. Typically, a pair of rails is used and the loading acts in the centre on both rails.
In this case, the load capacity of a rail pair is:



$$P_1 = 2 \cdot C_{0rad}$$

Fixing Screws

The fixings crews are not included in the scope of supply.
All rails are fixed with counter-sunk or cap head screws as per DIN 7991 or 7984. In size 63 of the ASN series, Torx® screws with low head cap screws are available on request.



Size	Screw type	d	D	L	K	S
			mm			
43	M8 x 16	M8 x 1,25	16	16	3	T40
63	M8 x 20	M8 x 1,25	13	20	5	T40

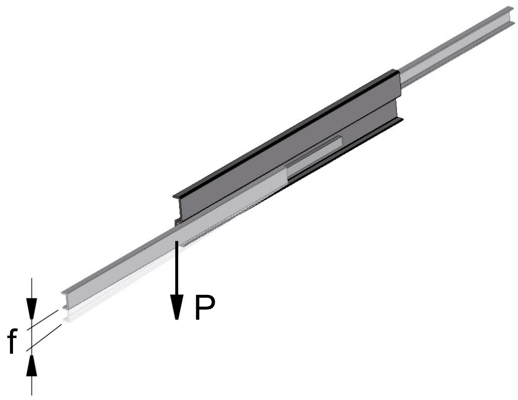
Tightening torques of the standard fixing screws to be used

Property Class	Size	Tightening torque Nm
10,9	22	4,3
	28	8,5
	35	14,6
	43	34,7
	63	34,7

Deflection

If the load P acts vertically on the rail, the expected elastic deflection of the individual telescopic rail in the extended state can be determined as follows:

$$f = \frac{q}{t} \cdot P \text{ (mm)}$$



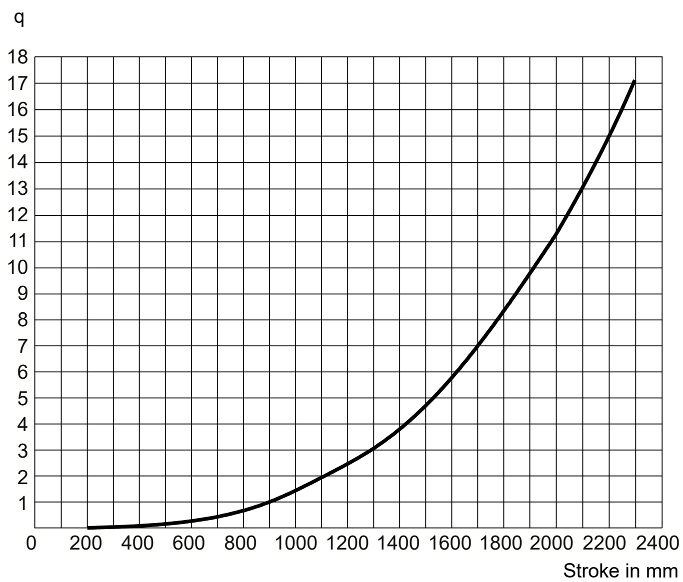
Whereby:

f is the expected elastic deflection in mm
q is a stroke coefficient
t is a factor depending on the model of the telescopic rail
P is the actual load acting on the centre of a rail, in N

DS28	**t = 180**
DS43	**t = 800**
DE22	**t = 8**
DE28	**t = 17**
DE35	**t = 54**
DE43	**t = 120**
DE63	**t = 540**
DBN22	**t = 3**
DBN28	**t = 8**
DBN35	**t = 13**
DBN43	**t = 56**

Note! The above formula applies to a single rail. When using a rail pair, the load of the single rail is P = P1/2. This estimated value assumes an absolutely rigid adjacent construction. If this rigidity is not present, the actual deflection will deviate from the calculation.

Important! With the partial extensions of the ASN series, the deflection is almost completely determined by the rigidity, i.e. by the moment of inertia of the adjacent construction.



Static Load

The telescopic extension of the various series accept different forces and moments. 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 effect the running properties and the mechanical strength. A safety factor, z, 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 z

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 at the most.

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

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

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

P_{0rad} = effective radial load
C_{0rad} = permissible radial load
P_{0ax} = effective axial load
C_{0ax} = permissible axial load
M_1 = effective moment in the x-direction
M_x = permissible moment in the x-direction
M_2 = effective moment in the y-direction
M_y = permissible moment in the y-direction
M_3 = effective moment in the z-direction
M_z = permissible moment in the z-direction

Service Life

The service life is defined as the time span between commissioning and the first fatigue or wear indications on the raceways. The service life of a telescopic rail is dependent on several factors, such as the effective load, the installation precision, occurring shocks and vibrations, the operating temperature, the ambient conditions and the lubrication. Calculation of the service life is based exclusively on the loaded rows of balls. In practice, the decommissioning of the bearing, due to its destruction or extreme wear of a component, represents the end of service life. This is taken into account by an application coefficient (f_i in the formula below), so the service life consists of:

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

L_{km} = calculated service life in km
δ = load capacity factor in N
W = equivalent load in N
f_i = application coefficient

Application coefficient f_i

Neither shocks nor vibrations, smooth and low-frequency direction change, clean environment	1,3 - 1,8
Light vibrations and average direction change	1,8 - 2,3
Shocks and vibrations, high-frequency direction change, very dirty environment	2,3 - 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 (f_i = 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:

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

Load Capacity Factor δ

Length	ASN					DS		DE.../DBN				
	22	28	35	43	63	28	43	22	28	35	43	63
	δ (N)											
130	415	872						165	357			
210	932	1577	1533	2288				386	655	614	923	
290	1295	2692	2906	4055		863		537	1153	1211	1687	
370	1665	3405	3721	4794		1164		690	1456	1552	1974	
450	2205	4119	4537	6602		1466		925	1759	1892	2764	
530	2567	4832	5990	8451		1768	3120	1075	2063	2540	3580	
610	2936	5557	6803	10325	15003	2078	3929	1229	2372	2878	4414	6203
690	3480	6271	7617	11005	17708	2381	4197	1467	2675	3217	4661	7361
770	3842	6984	9093	12877	20427	2684	5010	1616	2979	3881	5493	8527
850		8111	9903	14762	23155	3180	5836		3487	4218	6335	9699
930		8811	10714	15429	25889	3474	6090		3783	4555	6572	10875
1010		9524	12201	17310	28629	3778	6916		4086	5226	7411	12055
1090		10237	13009	17981	31374	4081	7750		4388	5561	8257	13238
1170		10950	13818	19860	34121	4384	7646		4691	5897	8489	14423
1250			15311	21747	36871	4896	8829			6573	9332	15610
1330			16118	22411	39623	5193	9077			6907	9568	16798
1410			16925	24295	42377	5496	9909			7242	10409	17987
1490			18423	26186	45133	5806	10746			7920	11255	19178
1570				28083	47890		10988				12105	20369
1650				28733	50648		11825				12330	21561
1730				30626	53407		12665				13178	22754
1810				31281	56166		12904				13406	23948
1890				33172	58927		13743				14252	25142
1970				33829	61688		13983				14483	26336

Extension and Extraction Force

The required actuation forces of a telescopic rail depend on the acting load and the deflection in the extended state. The force required for opening is principally determined by the coefficient of friction of the linear bearing. With correct assembly and lubrication, this is 0.01. During the extension, the force is reduced with the elastic deflection of the loaded telescopic rail. A higher force is required to close a telescopic extension, since, based on the elastic deflection, even if it is minimal, the movable rail must move against an inclined plane.

Double-sided Stroke

For all designs allowing double-sided stroke, it must be observed that the position of the intermediate element is defined only in the extended state. In the extracted state, the intermediate element can protrude by half of its length on each side. Exception is the ASN series, which comes out as a partial extension without an intermediate element and the custom design of series DE with driving disc. The double-sided stroke in series ASN, DE und DBN is achieved by removing the set screw. For series DS version D, the double-sided stroke is implemented by design adaptation.

Remarks

- Horizontal installation is recommended.
- Vertical installation on request, please contact Rollco.
- External end stops are recommended.
- Double-sided stroke.
- Custom strokes on request.
- All load capacity data are based on one telescopic rail.
- All load capacity data are based on continuous operation.
- Calculation of the service life is based exclusively on the loaded rows of balls.
- ASN 63 can be fixed with Torx® screws as an alternative.
- Fixing screws of property class 10.9 must be used for all telescopic rails.
- Internal stops are used to stop the unloaded slider and the ball cage. Please use external stops as end stops for a loaded system.