

**ROLLCO**

# **TECHNICAL INFORMATION**

## **TELESCOPIC RAIL HEAVY**

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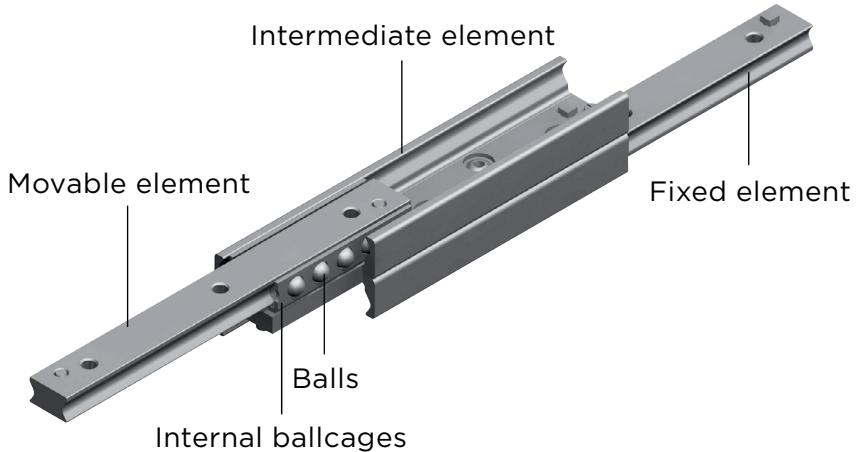
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## Product overview



The Telescopic Rail Heavy range consists of versions with full and partial extension and various cross-sections and intermediate elements in S-shape, double-T or square. High loads in combination with cost-efficiency and free movement have long been the outstanding properties of the telescopic rail product line.

## Characteristics

- High load with low deflection.
- Rigid intermediate elements.
- Standardised gauge for holes.
- Zero-play running even with maximum load.
- Space saving design.
- High reliability.

## Application areas

- Railcars (e. g. maintenance and battery extensions, doors).
- Construction and machine technology (e.g., housings and doors).
- Logistics (e.g., extensions for containers or gripper movements).
- Automotive technology.
- Packaging machines.
- Beverage industry.
- Special machines.

## Technical Data

- Available sizes:  
ASN / DE: 22, 28, 35, 43, 63  
DS: 28, 43  
DBN: 22, 28, 35, 43
- Rails and sliders made of cold-drawn bearing steel.
- Induction hardened raceways.
- Balls made of hardened bearing steel.
- Max. operating speed: 0.8 m/s (depending on application).
- Electrolytic zinc-plating as per ISO 2081; increased anticorrosive protection on request.
- Temperature range:  
ASN / DE / DBN: -20 °C to +170 °C (-4 °F to +338 °F)  
DS: -20 °C to +80 °C (-4 °F to +176 °F)

## Rail types

### ASN series

Partial extension consisting of a guide rail and a slider. This compact size and simple design allow very high load capacities. The high system rigidity is formed in connection with the adjacent construction.



### DS series

Full extension consisting of two guide rails made of fixed and movable elements and an S-shaped intermediate element. This has a high moment of inertia and high rigidity with slim size. This results in a high loading capacity with low deflection in the extended state. The DS series is available in three different designs: Version S with one-sided extension, Version B with locking in the extracted state for one-sided extension (DSB) and Version D with double-sided extension (DSD).



### DE series

Full extension consisting of two guide rails, combined as double-T profile, form the intermediate element, and two sliders, which as fixed and movable element form the connection to the adjacent construction. The square cross-section allows a compact size with high load capacities and low deflection, especially with radial loading. A custom design is available for extensions with double-sided strokes. The simultaneous movement of the intermediate element is implemented with a driving disc.



### DBN series

Full extension consisting of two guide rails, both fixed and movable, and two sliders which together form the intermediate element. The size is similar to the DE series and offers good protection from dirt of the open ballcage.



## Selection of telescopic rail

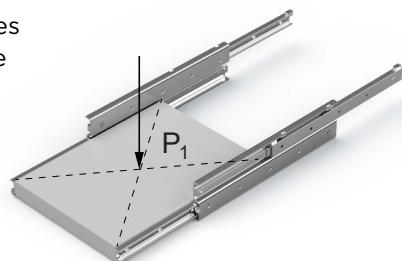
Selecting the suitable telescopic rail should be done based on the load and the maximum permissible deflection in the extended state. The load capacity of a telescopic rail depends on two factors: the loading capacity of the ballcage and the rigidity of the intermediate element. For mainly short strokes 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.

## Static load check

The load capacity values stated on our websites of the corresponding series give the maximum permissible loading of a pair of rails in the middle of the two rails and in the center line of the moving element with the rails in the completely extended state. Using a pair of rails, the loading acts in the centre on both rails (see fig.).

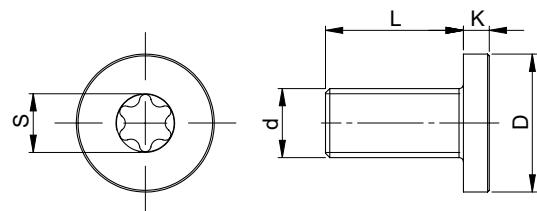
The load capacity of a rail pair is:

$C_{0rad}$



## 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.



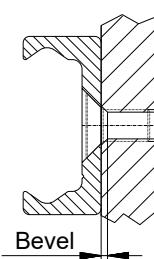
Size	Screw type	d	D	L mm	K	s
63	M8 x 20	M8 x 1,25	13	20	5	T40

### Tightening torques of the standard fixing screws to be used

Property Class	Size	Tightening torque (Nm)
10,9	22	3
	28	6
	35	10
	43	25
	63	30

Prepare a sufficient bevel on the threaded fixing holes, according to the following table:

Size	Bevel (mm)
22	0.5 x 45°
28	1 x 45°
35	1 x 45°
43	1 x 45°
63	1 x 45°



## Deflection

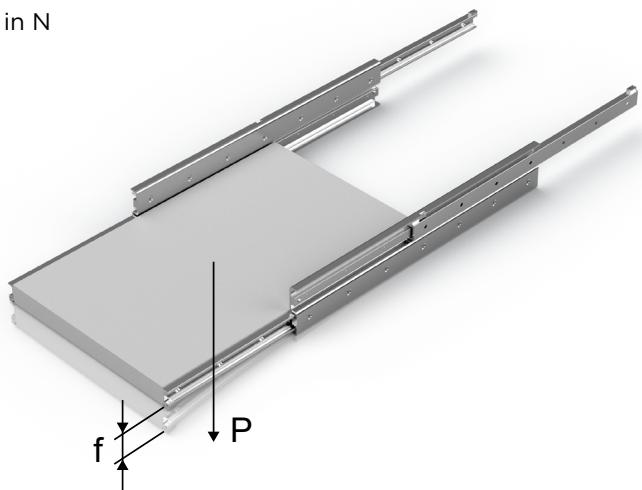
If the load  $P$  acts vertically on the pair of rails the expected elastic deflection in the extended state can be determined as follows:

$$f = \frac{q}{t} \cdot P$$

Whereby:

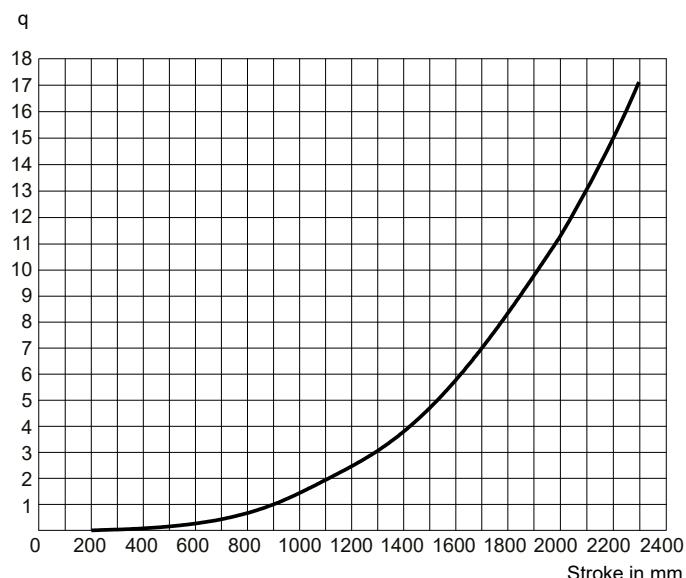
- $f$  is the expected elastic deflection in mm
- $q$  is a stroke coefficient
- $t$  is a factor depending on the model of the telescopic rail
- $P$  is the actual load acting on the centre of a pair of rails, in N

<b>DS28</b>	<b><math>t = 360</math></b>
<b>DS43</b>	<b><math>t = 1600</math></b>
<b>DE22</b>	<b><math>t = 16</math></b>
<b>DE28</b>	<b><math>t = 34</math></b>
<b>DE35</b>	<b><math>t = 108</math></b>
<b>DE43</b>	<b><math>t = 240</math></b>
<b>DE63</b>	<b><math>t = 1080</math></b>
<b>DBN22</b>	<b><math>t = 6</math></b>
<b>DBN28</b>	<b><math>t = 16</math></b>
<b>DBN35</b>	<b><math>t = 26</math></b>
<b>DBN43</b>	<b><math>t = 112</math></b>



**Note!** 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, COrad, the axial load capacity, COax, and moments Mx, My and Mz indicate the maximum permissible values of the loads; higher loads negatively effect the running properties and the mechanical strength. A safety factor, So, 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  $S_o$

Neither shocks nor vibrations, smooth and low-frequency reverse, high assembly accuracy, no elastic deformations	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  $S_o$  at the most.

$$\frac{P_{Orad}}{C_{Orad}} \leq \frac{1}{S_o} \quad \frac{P_{Oax}}{C_{Oax}} \leq \frac{1}{S_o} \quad \frac{M_1}{M_x} \leq \frac{1}{S_o} \quad \frac{M_2}{M_y} \leq \frac{1}{S_o} \quad \frac{M_3}{M_z} \leq \frac{1}{S_o}$$

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:

$$\frac{P_{Orad}}{C_{Orad}} + \frac{P_{Oax}}{C_{Oax}} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \leq \frac{1}{S_o}$$

$P_{Orad}$  = effective radial load

$C_{Orad}$  = permissible radial load

$P_{Oax}$  = effective axial load

$C_{Oax}$  = 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<sub>km</sub>** = calculated service life in km

**δ** = load capacity factor in N

**W** = equivalent load in N

**f<sub>i</sub>** = application coefficient

### Application coefficient f<sub>i</sub>

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,  $C_{rad}$ , (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:

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

## Load capacity factor $\delta$

Length	ASN					DS		DE.../DBN						
	22	28	35	43	63	28	43	22	28	35	43	63		
$\delta$ (N)														
130	830	1744						330	714					
210	1864	3154	3066	4576						772	1310	1228		
290	2590	5384	5812	8110	1726					1074	2306	2422		
370	3330	6810	7442	9588	2328					1380	2912	3104		
450	4410	8238	9074	13204	2932					1850	3518	3784		
530	5134	9664	11980	16902	3536					2150	4126	5080		
610	5872	11114	13606	20650	30006	4156	7858	2458	4744	5756	8828	12406		
690	6960	12542	15234	22010	35416	4762	8394	2934	5350	6434	9322	14722		
770	7684	13968	18186	25754	40854	5368	10020	3232	5958	7762	10986	17054		
850	16222		19806	29524	46310	6360	11672	6974		8436	12670	19398		
930	17622		21428	30858	51778	6948	12180	7566		9110	13144	21750		
1010	19048		24402	34620	57258	7556	13832	8172		10452	14822	24110		
1090	20474		26018	35962	62748	8162	15500	8776		11122	16514	26476		
1170	21900		27636	39720	68242	8768	15292	9382		11794	16978	28846		
1250	30622		43494	73742	9792	17658						13146		
1330	32236		44822	79246	10386	18154						18664		
1410	33850		48590	84754	10992	19818						31220		
1490	36846		52372	90266	11612	21492						13814		
1570			56166	95780	21976									
1650			57466	101296	23650									
1730			61252	106814	25330									
1810			62562	112332	25808									
1890			66344	117854	27486									
1970			67658	123376	27966									

## 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 and DBN is achieved by removing the set screw. For series DS version D, the double-sided stroke is implemented by design adaptation.

## Special strokes

Special strokes are defined as deviations from standard stroke H. The special strokes are available in steps according to the column Stroke modification in the table below. These values are dependent on the spacing of the ballcage.

ASN-22-130 has a standard stroke of 76 mm (value from Rollco.se). Example of special stroke for this size: 76 + 7.5 = 83.5 mm. Possible to continue in steps of 7.5 mm. Order code: ASN-22-130-83.5

Type	Size	Stroke modification (mm)
ASN	22	7.5
	28	9.5
	35	12
	43	15
	63	20
DSS DE DBN	22	15
	28	19
	35	24
	43	30
	63	40

No stroke modification is possible for the DSD series.

Please be aware that there are a limit and each stroke modification influences the load capacities stated in this document and on our website. It is possible that after a stroke modification important fastening holes might no longer be accessible. The maximal modified stroke of ASN-type is 65% of the rail-length and 130% for DSS, DE and DBN. For more information please contact Rollco.

## Clearance and preload

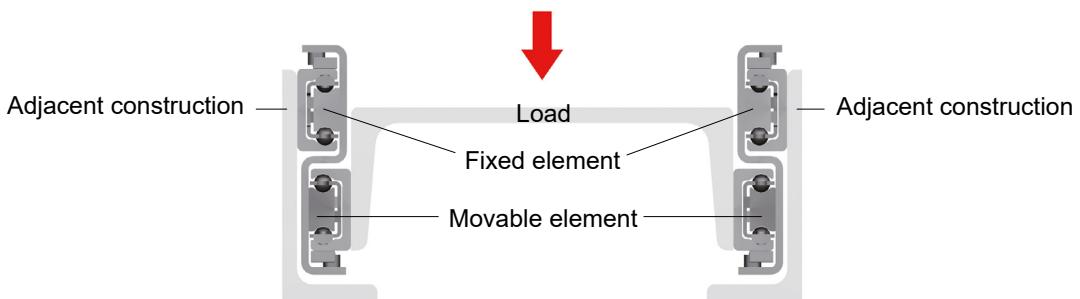
Telescopic rail guides are mounted as standard with no play. For more information, please contact Rollco.

Preload classes		
Increased clearance	No clearance	Increased preload
G1	Standard	K1

## 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 refer to a pair of rails.
- 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.

# Installation instructions



## General

- Internal stops are used to stop the unloaded slider and the ball cage. Please use external stops as end stops for a loaded system.
- To achieve optimum running properties, high service life and rigidity, it is necessary to fix the telescopic rails with all accessible holes on a rigid and level surface. When using two telescopic rails, please observe the parallelism of the installation surfaces. The fixed and movable rails fit to the rigid assembly construction.
- Telescopic Rail guides are suitable for continuous use in automatic systems. For this, the stroke should remain constant in all moving cycles and the operating speed must be checked. The movement of the telescopic rails is enabled by internal ballcages, which could experience an offset from the original position with differing strokes. This phase offset can have a negative effect on the running properties or limit the stroke. If differing strokes occur in an application, the drive force must be sufficiently dimensioned in order to appropriately synchronise the ballcage offset. Otherwise, an additional maximum stroke must be planned regularly to ensure the correct position of the ballcage.

## ASN

- Series ASN accepts radial and axial loads and moments in all principle directions.
- Horizontal and vertical application is possible. If vertical installation, please contact Rollco.
- The installation of two partial extensions on a profile provides a load capable full extension. For individual solutions, please contact Rollco.

## DE/DBN

- Series DE and DBN accept radial and axial loads.
- Horizontal and vertical application is possible. Prior to vertical installation, we recommend a check by application technology.
- The functionality of custom design DE...D is only guaranteed if the stroke available is completely used.

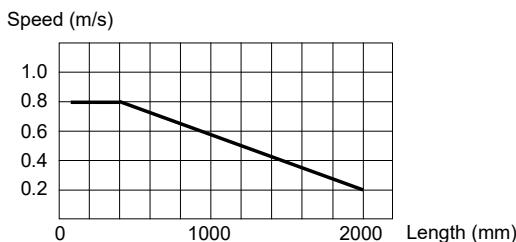
## DS

- Series DS accept radial loads. This should act in the vertical cross-sectional axis on the movable rails.
- Horizontal and vertical application is possible. Prior to vertical installation, we recommend a check by application technology.
- When installing make sure that the load is placed on the movable element (the lower rail). The opposite assembly negatively affects the function.
- Installation must be done on a rigid adjacent construction using all accessible fixing holes.
- Pay attention to the parallel alignment during assembly with paired application.

# Operating conditions

## Speed

The maximum operating speed is determined by the mass of the intermediate element, which moves with the movable rail. This reduces the maximum permissible operating speed with increasing length.



## Temperature

- Series ASN, DE and DBN can be used up to an ambient temperature of +170 °C (+338 °F). A lithium lubricant for high operating temperatures is recommended for temperatures above +130 °C (+266 °F). Minimum temperature with standard grease is -20°C (-4°F)
- Series DS have a useable range of -20°C to +80°C (-4°F to +176°F) due to rubber stop.

## Corrosion protection

All rails are supplied with a standard corrosion protection system consisting of electrolytic zinc plating according to ISO 2081. If increased corrosion protection is required, application-specific surface treatments are available upon request, for example approved nickel plating suitable for use in the food industry. In such cases, the selected surface treatment must be specified in the order. See the table below for available options.

When special surface treatments are requested, all sub-components are treated accordingly. For small components, if the exact requested surface treatment is not available, the part will be supplied in stainless steel or with an alternative treatment that increases durability.

Please note that special surface treatments are produced on request and will affect lead times. Please contact us for further information.

## Surface treatment characteristics

Treatment	Code	Description	Thickness	Salt spray resistance
Zinc Plating ISO 2081 (standard)	-	Standard treatment, ideal for indoor applications. Zinc-plated telescopic rails are supplied with steel balls	8 µm	96 h
Zinc Nickel ISO19598	Z	Zinc-nickel plating, ideal for outdoor applications. Telescopic rails with this treatment are supplied with stainless steel balls to further increase the corrosion resistance.	10 µm	816 h
Nickel plating	N	Electroless nickel plating which provides high resistance to chemical corrosion and is ideal for applications in medical or food related environments. Raceways are coated too. Telescopic rails with nickel plating are supplied with stainless steel balls to further increase the corrosion resistance.	10 µm	Chemical resistance
E-coating	K	Black cataphoresis. Electro painting that provides a fine black finishing to the entire rail. It can be partially removed from the raceways on the running contact point of the balls after a period of use. Telescopic rails with E-coating are supplied with stainless steel balls to further increase the corrosion resistance.	15-20 µm	504 h

## **Lubrication**

- Recommended lubrication intervals are heavily dependent upon the ambient conditions, speed and temperature. Under normal conditions, lubrication is recommended after 100 km operational performance or after an operating period of six 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 Rollco.

## ASN, DSS, DSD & DBN Series

ASN 63 - 770 - 433

**Series**

(ASN, DSS, DSD, DBN)

**Height of slide\***

(22, 28, 35, 43, 63)

**Length of fixed member**

**Stroke example, if deviating from standard stroke**

\*DSS and DSD are only available in size 28 and 43.

## DE Series

DE F 35 - 690 - 806

**Series**

(DE)

**Type of hole:**

F: threaded

V: countersunk

M: both variants (mixed)

(size 63 only F)

**Height of intermediate member**

(22, 28, 35, 43, 63)

**Length of fixed member**

**Stroke example, if deviating from standard stroke**

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