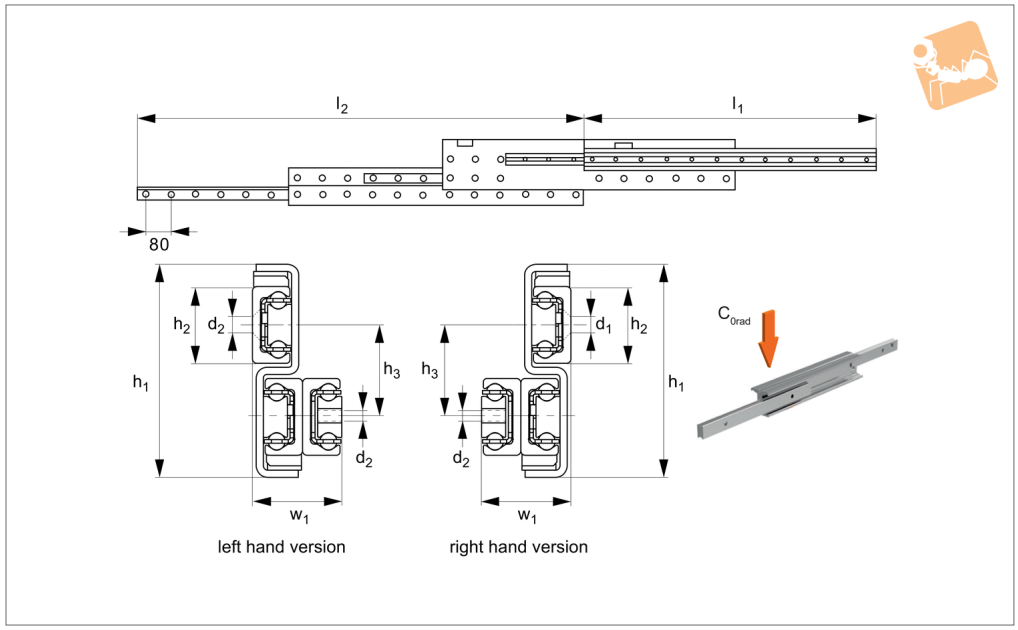


L1997

Material

Cold drawn bearing steel raceways hardened to 60 HRc. Balls - hardened steel.
Zinc coating to ISO2081 (excluding raceways). Corrosion resistant coatings available on request.

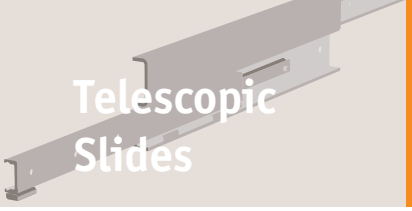
Technical Notes

These are very heavy duty telescopic rails with strokes of over 150% of closed length.
C_{0rad} is the load rating for a single telescopic slide.
Moving rail must be lower rail (unless technical department consulted).

Tips

These are handed rails - i.e. left and right hands to be specified.

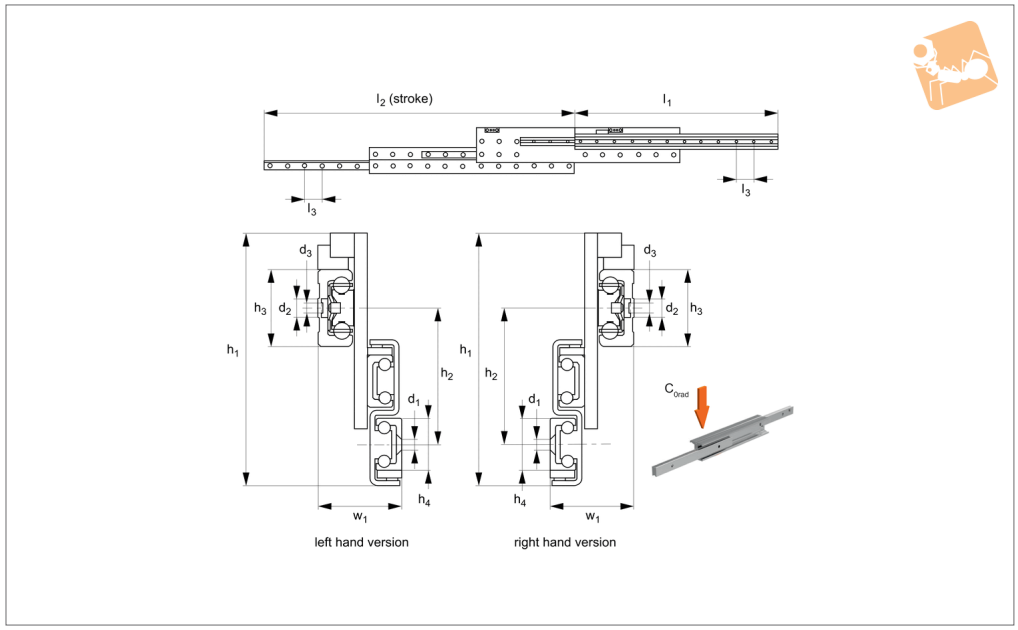
Order No.	Type	l_1	l_2	h_1	w_1	h_2	h_3	d_1	d_2	Load (per rail) $C_{0\ rad}$ N max.
L1997.43-0530R	Right	530	834	120	50	43	52	8.5	M8	1291
L1997.43-0610R	Right	610	939	120	50	43	52	8.5	M8	1632
L1997.43-0690R	Right	690	1089	120	50	43	52	8.5	M8	1735
L1997.43-0770R	Right	770	1194	120	50	43	52	8.5	M8	2077
L1997.43-0850R	Right	850	1299	120	50	43	52	8.5	M8	2426
L1997.43-0930R	Right	930	1449	120	50	43	52	8.5	M8	2506
L1997.43-1010R	Right	1010	1554	120	50	43	52	8.5	M8	2364
L1997.43-1090R	Right	1090	1659	120	50	43	52	8.5	M8	2238
L1997.43-1170R	Right	1170	1809	120	50	43	52	8.5	M8	2022
L1997.43-1250R	Right	1250	1914	120	50	43	52	8.5	M8	1928
L1997.43-1330R	Right	1330	2064	120	50	43	52	8.5	M8	1766
L1997.43-1410R	Right	1410	2169	120	50	43	52	8.5	M8	1694
L1997.43-1490R	Right	1490	2274	120	50	43	52	8.5	M8	1628
L1997.43-1570R	Right	1570	2409	120	50	43	52	8.5	M8	1567
L1997.43-1650R	Right	1650	2529	120	50	43	52	8.5	M8	1458
L1997.43-1730R	Right	1730	2634	120	50	43	52	8.5	M8	1409
L1997.43-1810R	Right	1810	2784	120	50	43	52	8.5	M8	1320
L1997.43-1890R	Right	1890	2889	120	50	43	52	8.5	M8	1280
L1997.43-1970R	Right	1970	3039	120	50	43	52	8.5	M8	1206
L1997.43-0530L	Left	530	834	120	50	43	52	8.5	M8	1291
L1997.43-0610L	Left	610	939	120	50	43	52	8.5	M8	1632
L1997.43-0690L	Left	690	1089	120	50	43	52	8.5	M8	1735
L1997.43-0770L	Left	770	1194	120	50	43	52	8.5	M8	2077
L1997.43-0850L	Left	850	1299	120	50	43	52	8.5	M8	2426
L1997.43-0930L	Left	930	1449	120	50	43	52	8.5	M8	2506
L1997.43-1010L	Left	1010	1554	120	50	43	52	8.5	M8	2364
L1997.43-1090L	Left	1090	1659	120	50	43	52	8.5	M8	2238
L1997.43-1170L	Left	1170	1809	120	50	43	52	8.5	M8	2022
L1997.43-1250L	Left	1250	1914	120	50	43	52	8.5	M8	1928
L1997.43-1330L	Left	1330	2064	120	50	43	52	8.5	M8	1766

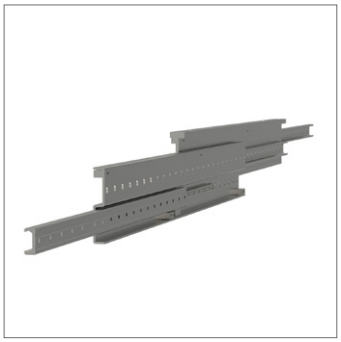


Extended Stroke Telescopic Slides

heavy duty

Order No.	Type	l_1	l_2	h_1	w_1	h_2	h_3	d_1	d_2	Load (per rail) $C_{0\ rad}$ N max.
L1997.43-1410L	Left	1410	2169	120	50	43	52	8.5	M8	1694
L1997.43-1490L	Left	1490	2274	120	50	43	52	8.5	M8	1628
L1997.43-1570L	Left	1570	2409	120	50	43	52	8.5	M8	1567
L1997.43-1650L	Left	1650	2529	120	50	43	52	8.5	M8	1458
L1997.43-1730L	Left	1730	2634	120	50	43	52	8.5	M8	1409
L1997.43-1810L	Left	1810	2784	120	50	43	52	8.5	M8	1320
L1997.43-1890L	Left	1890	2889	120	50	43	52	8.5	M8	1280
L1997.43-1970L	Left	1970	3039	120	50	43	52	8.5	M8	1206





L1998

Material

Cold drawn bearing steel raceways hardened to 60 HRc. Balls - hardened steel.
Zinc coating to ISO2081 (excluding raceways). Corrosion resistant coatings available on request.

Technical Notes

These are very heavy duty telescopic rails with strokes of over 150% of closed length.
C_{0rad} is the load rating for a single telescopic slide.
Moving rail must be lower rail (unless technical department consulted).

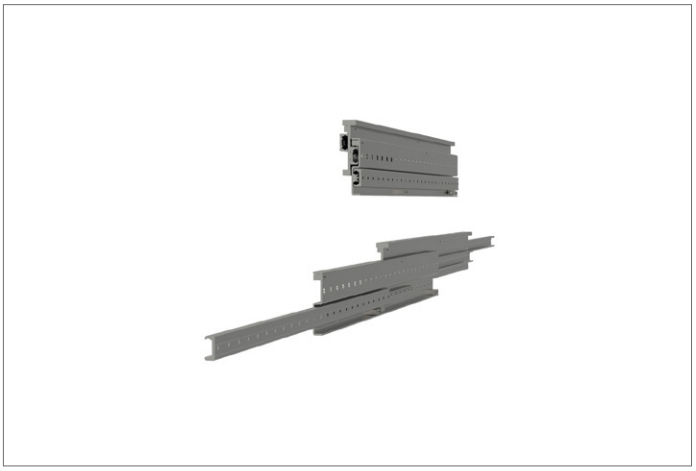
Tips

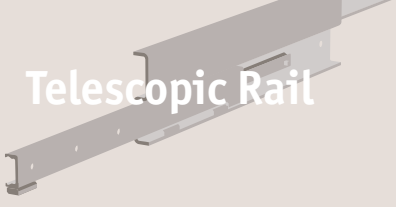
These are handed rails - i.e. left and right hands to be specified.

Order No.	Type	l_1	l_2 stroke	l_3	h_1	w_1	h_2	h_3	h_4	d_1	d_2	d_3	Load (per rail) $C_{0\ rad}$ N max.
L1998.63-0930R	Right	930	1444	80	207.5	68	112	63	43	8.5	15	9	4036
L1998.63-1010R	Right	1010	1554	80	207.5	68	112	63	43	8.5	15	9	4590
L1998.63-1090R	Right	1090	1664	80	207.5	68	112	63	43	8.5	15	9	4908
L1998.63-1170R	Right	1170	1804	80	207.5	68	112	63	43	8.5	15	9	4610
L1998.63-1250R	Right	1250	1914	80	207.5	68	112	63	43	8.5	15	9	4398
L1998.63-1330R	Right	1330	2054	80	207.5	68	112	63	43	8.5	15	9	4027
L1998.63-1410R	Right	1410	2164	80	207.5	68	112	63	43	8.5	15	9	3864
L1998.63-1490R	Right	1490	2274	80	207.5	68	112	63	43	8.5	15	9	3713
L1998.63-1570R	Right	1570	2414	80	207.5	68	112	63	43	8.5	15	9	3445
L1998.63-1650R	Right	1650	2524	80	207.5	68	112	63	43	8.5	15	9	3325
L1998.63-1730R	Right	1730	2634	80	207.5	68	112	63	43	8.5	15	9	3213
L1998.63-1810R	Right	1810	2774	80	207.5	68	112	63	43	8.5	15	9	3011
L1998.63-1890R	Right	1890	2884	80	207.5	68	112	63	43	8.5	15	9	2919
L1998.63-1970R	Right	1970	3024	80	207.5	68	112	63	43	8.5	15	9	2750
L1998.63-0930L	Left	930	1444	80	207.5	68	112	63	43	8.5	15	9	4036
L1998.63-1010L	Left	1010	1554	80	207.5	68	112	63	43	8.5	15	9	4590
L1998.63-1090L	Left	1090	1664	80	207.5	68	112	63	43	8.5	15	9	4908
L1998.63-1170L	Left	1170	1804	80	207.5	68	112	63	43	8.5	15	9	4610
L1998.63-1250L	Left	1250	1914	80	207.5	68	112	63	43	8.5	15	9	4398
L1998.63-1330L	Left	1330	2054	80	207.5	68	112	63	43	8.5	15	9	4027
L1998.63-1410L	Left	1410	2164	80	207.5	68	112	63	43	8.5	15	9	3864
L1998.63-1490L	Left	1490	2274	80	207.5	68	112	63	43	8.5	15	9	3713
L1998.63-1570L	Left	1570	2414	80	207.5	68	112	63	43	8.5	15	9	3445
L1998.63-1650L	Left	1650	2524	80	207.5	68	112	63	43	8.5	15	9	3325
L1998.63-1730L	Left	1730	2634	80	207.5	68	112	63	43	8.5	15	9	3213
L1998.63-1810L	Left	1810	2774	80	207.5	68	112	63	43	8.5	15	9	3011
L1998.63-1890L	Left	1890	2884	80	207.5	68	112	63	43	8.5	15	9	2919
L1998.63-1970L	Left	1970	3024	80	207.5	68	112	63	43	8.5	15	9	2750

Extended Stroke Telescopic Slides

ultra heavy duty

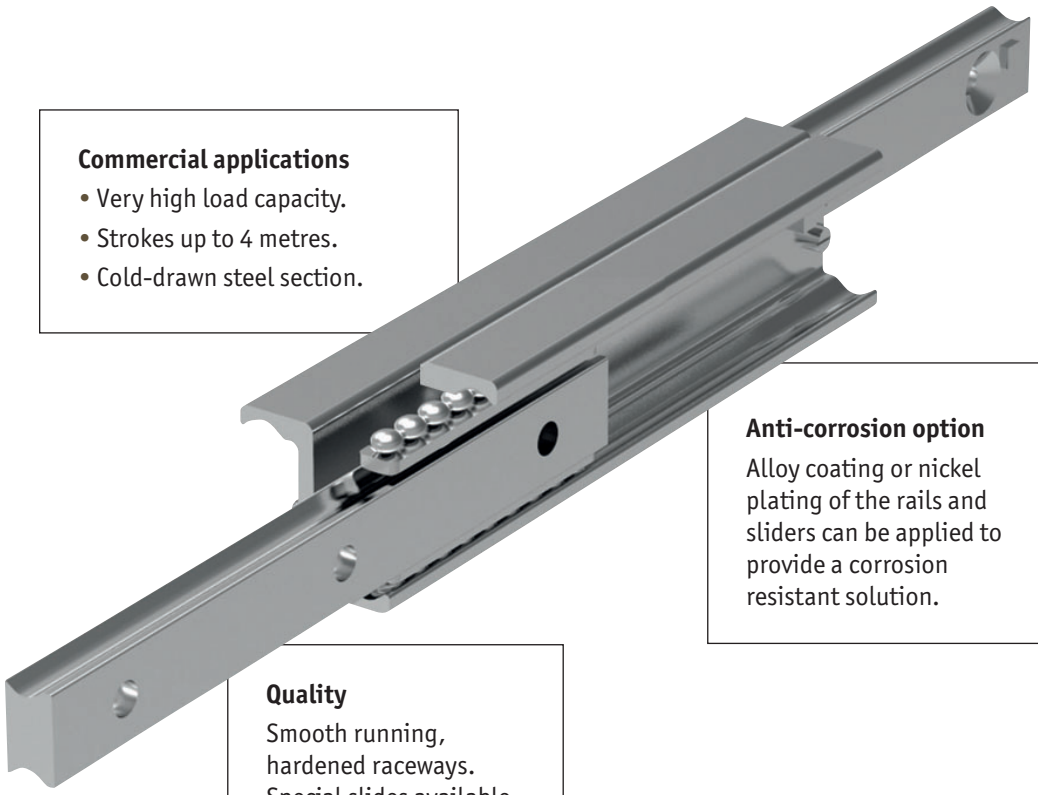




If you are looking for heavy duty, quality telescopic rails for industrial or commercial applications then these are the rails for you!

The best heavy duty telescopic slides on the market

These are unique rails that are not made from pressed steel but from cold-drawn steel section. The rails can take high loads, with very long strokes, with repeated use, low deflection and minimal play.



Commercial applications

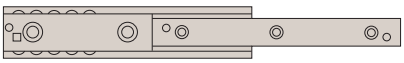
- Very high load capacity.
- Strokes up to 4 metres.
- Cold-drawn steel section.

Anti-corrosion option

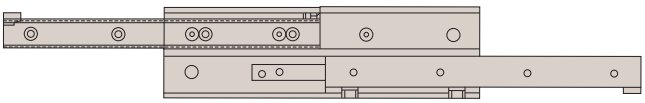
Alloy coating or nickel plating of the rails and sliders can be applied to provide a corrosion resistant solution.

Quality

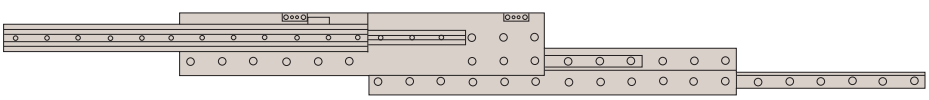
Smooth running, hardened raceways. Special slides available.



Partial Stroke (~60%)



Full Stroke (~100%)



Over-extension (150%)

Rail types

Our range of telescopic rails covers partial, full stroke and over-extension.

For more information refer to our product specifications pages or call our technical department.

Telescopic Rail

Specifications and applications

Specifications

- Generally all our telescopic rails have induction hardened raceways.
- Cold drawn roller bearing steel.
- Maximum operating speed 0,8 m/s.
- Temperature range (mainly -30°C to +170°C).
- Electrolytic galvanised to ISO 2081, other anti-corrosion finishes on request.
- High load ratings with low deflection characteristics.
- Minimum play (even at maximum load ratings).
- Smooth, free running movement.
- Long strokes and heavy load ratings.
- Can be used in horizontal applications only (due to the use of a ball cage), with the exception of part number L1985 which uses roller bearings.
- Light duty "cage stops" are included on the telescopic rails to prevent damage to the ball cage. External end stops must be designed into your application (to protect the rails from high forces and possible damage on opening and closing).
- For telescopic rails with an "upper" and "lower" rail, the moving rail should be the lower one. Using the upper rail as the moving element effects the smooth running and the load capacity of the telescopic sliders.
- All load capacity figures are given for a single rail, and based on continuous use.
- Fix to structures using screws of strength class 10,9.
- Anti-corrosion option. We have a highly effective anti-corrosive coating option, and we utilise stainless steel ball bearings in this version.

Applications

Special purpose & packaging machines
Precision positioning systems
handling units
robotic systems • cutting machines

Seating
Sliding seats
disability ramps
seat extensions

Safety guarding
Extending protective systems
sliding gates
automatic pick & place

Logistics solutions
Container extensions
heavy duty extending systems
sliding doors

Disability vehicles
Sliding seats
extension ramps

Transport (naval)
Sliding hatches
pull-out storage

Transport (rail)
Seat adjustment
sliding doors
battery removal units

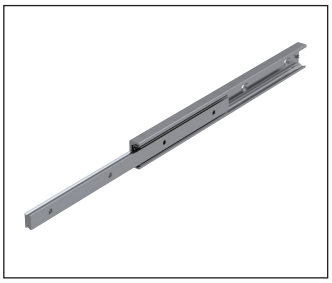
Transport (automotive)
Ambulance sliding systems
fire fighting vehicles
sliding panels

Transport (military)
Sliding seats
protective hatches
stretcher extensions

Partial extension telescopic slides

L1994 - these are extremely compact rails with a simple design and very high load ratings. They have high radial and axial load capacity as well as the ability to take considerable moment loads.

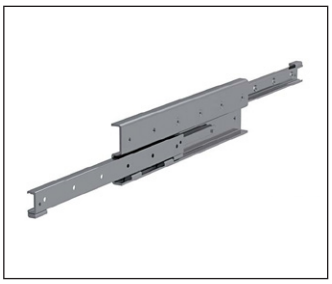
Standard extension	50%
Special extension range	up to 65% (on request)
Single & double direction?	Yes (remove end stop)
Number of rail sizes	5
Maximum extension (at 50%)	1010 mm
Maximum load (per rail)	4500 Kg



Full extension telescopic slides

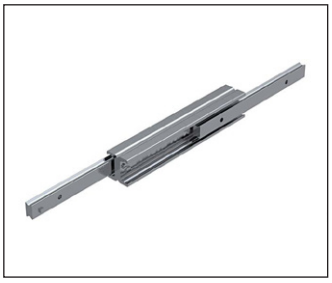
L1984 - these are very thin rails with high levels of rigidity and load capacity. Very low deflection even when fully loaded and in an open position.

Standard extension	100%
Special extension range	up to 130% (on request)
Single & double direction?	Yes (specify on ordering)
Number of rail sizes	4
Maximum extension (at 100%)	2020 mm
Maximum load (per rail)	1200 Kg



L1986 - a very low height rail gives the slide very rigid capabilities. The double T cross section allows a compact size with low radial loading deflection and axial load capability too.

Standard extension	100%
Special extension range	up to 130% (on request)
Single & double direction?	Yes (remove end stop)
Number of rail sizes	5
Maximum extension (at 100%)	2020 mm
Maximum load (per rail)	700 Kg



L1988 - the compact, low profile, square shaped configuration gives the slides similar load capacities for radial and axial loads.

Standard extension	100%
Special extension range	up to 130% (on request)
Single & double direction?	Yes (remove end stop)
Number of rail sizes	4
Maximum extension (at 100%)	2020 mm
Maximum load (per rail)	1250 Kg

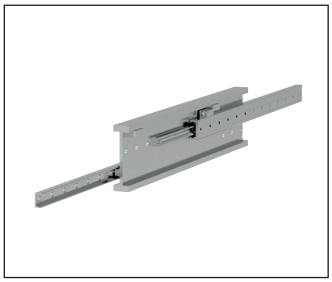
Technical Information

Product overview

L1992 - our lightest duty telescopic slides. Still from cold-drawn steel but with unhardended raceways making these parts robust but less expensive than our other telescopic rails.

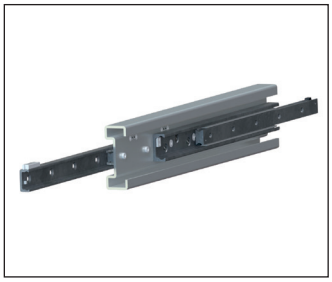
Standard extension	100%
Special extension range	No
Single & double direction?	No
Number of rail sizes	1
Maximum extension (at 100%)	1010 mm
Maximum load (per rail)	60 Kg

L1996 - these are ultra heavy-duty telescopic slides, for very heavy loads. An extremely rigid double T profile acts as an intermediate element providing a high load capacity and minimum deflection.



Standard extension	100%
Special extension range	up to 130% (on request)
Single & double direction?	On request
Number of rail sizes	1
Maximum extension (at 100%)	2250 mm
Maximum load (per rail)	1900 Kg

L1995 - these are compact design, heavy duty full stroke telescopic rails. They have a relatively light weight, and have induction hardened raceways for long-life.



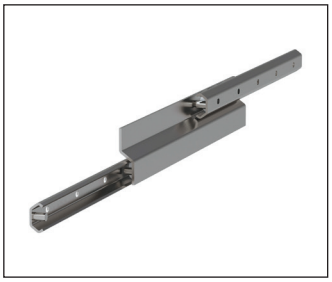
Standard extension	100%
Special extension range	up to 130% (on request)
Single & double direction?	Yes (remove end stop)
Number of rail sizes	4
Maximum extension (at 100%)	2020 mm
Maximum load (per rail)	550 Kg

L1985 - these are full extension slides to be used where dirt or other contaminants might be present. The ball bearings are replaced with large roller bearings (with wipers to clear the rail). Based on our compact rail system.

Standard extension	100%
Special extension range	No
Single & double direction?	No
Number of rail sizes	1
Maximum extension (at 100%)	1980 mm
Maximum load (per rail)	275 Kg

L1989 - these are full extension slides made from 316L stainless steel. For use in applications where corrosion may be a problem.

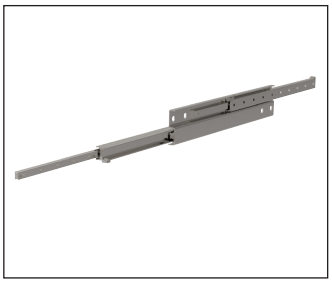
Standard extension	100%
Special extension range	No
Single & double direction?	No
Number of rail sizes	1
Maximum extension (at 100%)	1120 mm
Maximum load (per rail)	35 Kg



Extended stroke telescopic rails

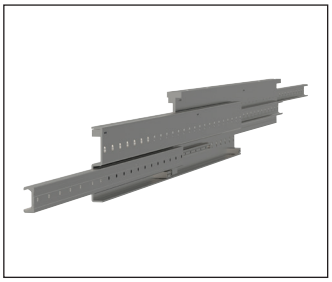
L1997 - these are extended stroke (150%), heavy duty telescopic rails, with high load capacity and stiffness.

Standard extension	150%
Special extension range	On request
Single & double direction?	No
Number of rail sizes	1
Maximum extension (at 150%)	3030 mm
Maximum load (per rail)	240 Kg



L1998 - these are extended stroke (150%), heavy duty telescopic rails. They have a solid steel intermediate element. They are our heaviest duty extended stroke units.

Standard extension	150%
Special extension range	On request
Single & double direction?	No
Number of rail sizes	1
Maximum extension (at 150%)	3020 mm
Maximum load (per rail)	480 Kg



How to select a telescopic rail

Firstly, these telescopic rails are for heavy duty applications, they are not made from pressed steel but from cold-drawn steel, with hardened raceways.

As a result they can be used in demanding applications and for repetitive applications or for applications where a high degree of product reliability is required as well as smooth and consistent operation. They have smooth movement, minimal play and a low coefficient of friction. There are no better telescopic rails available!

Stroke required

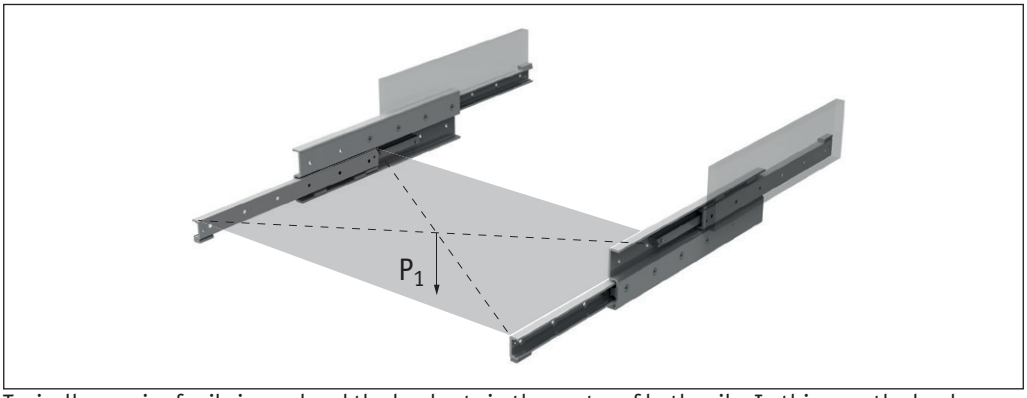
In general the partial extension (strokes of 50% of overall rail length) telescopic rails are less expensive than the full extension rails and over-extension rails.

Where possible the use of a double direction rail (i.e. can stroke forward and backwards) can be very cost-effective, allowing twice the stroke for the same rail length, but this may not suit many applications.

Load capacity

The next consideration is based on the load to be carried. All loads given are for a single rail and assume the load is centred in the mid-point of the moveable rail, in its extended position.

Important: In cases where the rail has an upper and lower rail, the receiving rail should be the lower one.



Typically, a pair of rails is used and the load acts in the centre of both rails. In this case the load capacity of the pair of rails is calculated as follows:

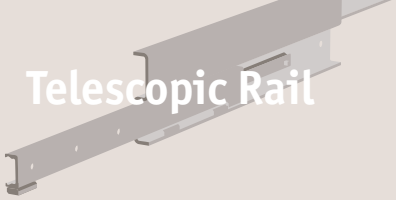
$$P_1 = 2 \cdot C_{0rad}$$

Some rails are more suited to axial loads and moment loads than others, dependent on their cross sectional form.

Rail shape

The different rail profiles and sizes allow rails to be chosen to suit various applications e.g.

L1984 - thin section.
L1992 - thin section (but lighter duty).
L1986 - low height.
L1988 - low height.
L1995 - very heavy duty.
L1996 - very heavy duty.



Anti-corrosion treatments

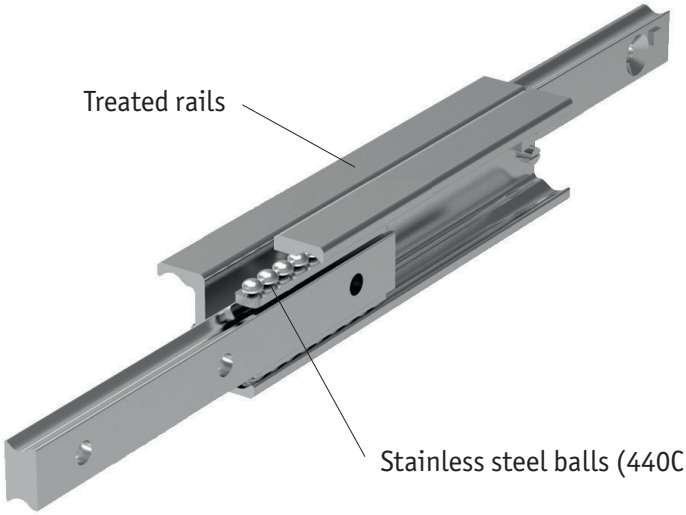
The telescopic slides have a standard electrolytic zinc plate coating (to ISO 2081).

We offer a number of alternatives to increase the anti-corrosion protection including nickel plating.

However, our preferred and most effective solution to inhibit corrosion is to apply a special corrosion resistant (Lanthane) plating to the rails and sliders and to combine this with stainless steel ball bearings.

This coating is applied after the zinc plating process and is a special trivalent chromium passivation that is approximately 15 microns thick (and is free of Chromium VI).

This applies a nano-particle coating and has extremely good results of 200 hours in salt spray tests before any signs of white rust.



Use with stainless steel fixing screws, strength class 10,9

Salt Spray Test (to DIN EN ISO 9227 NSS)

Coating after 720 hours salt spray

Chemical nickel plating after 360 hours

Testing conducted by independent institute

The coating on the telescopic slides is a soft coating and will (over time) wear off the raceways (which are subject to loads from the ball bearings) – this can be seen sometimes by a thin line on the raceways.

However lubricating the raceways with grease (as recommended) ensures, as far as possible, the good corrosion properties of the overall coating.

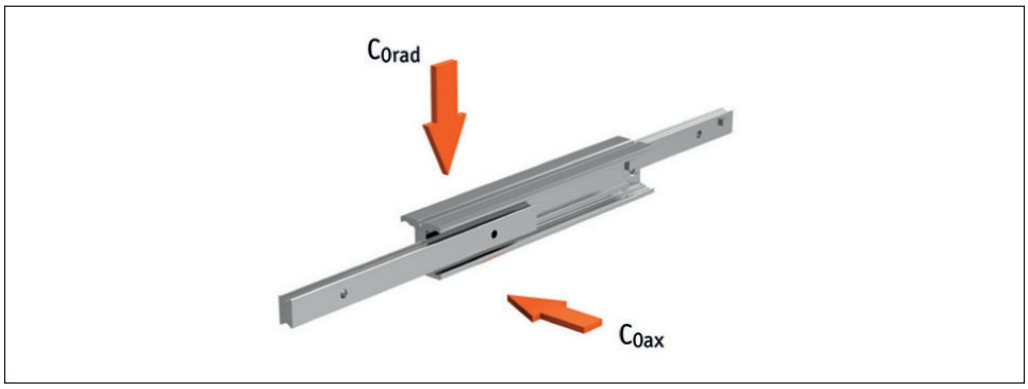
Telescopic Rail from Automotion Components

Technical Information

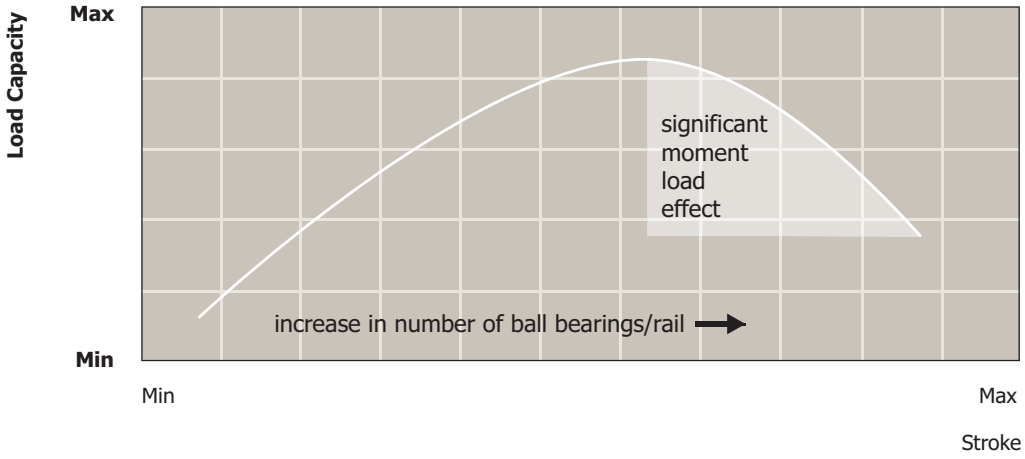
Load ratings explained

Wherever possible the telescopic rails should be used so that the main load applied is a radial load on the telescopic rail. Only certain types of our telescopic rails can accept axial loads.

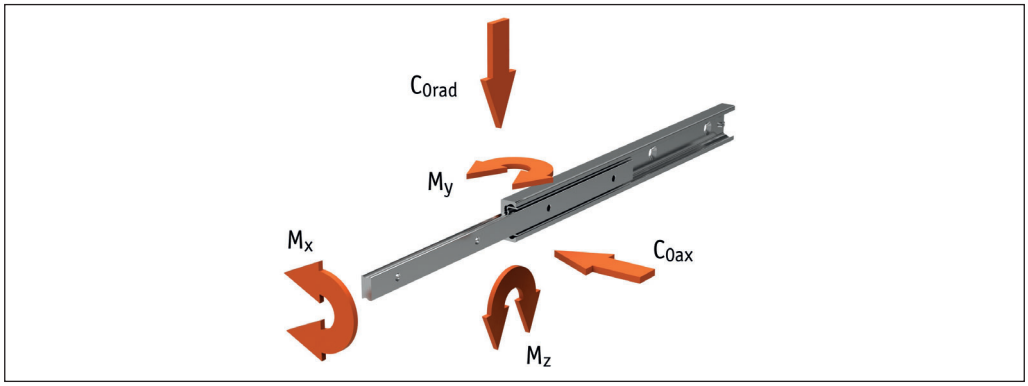
Typically the radial load is around an extra 60% to 100% of the axial load. All our load figures are shown per rail and assume that the load is centred about the mid-extended position of the rails.



For telescopic rails with an upper and lower element, the moving element should be the lower element. A typical telescopic rail size will have then following load capacity profile:-



Partially telescopic rails will have a considerably higher load capacity than fully telescopic rails, so if you have space to fit a partially telescopic rail (say 50% extension) then choosing this type can allow a smaller profile size rail to be chosen, reducing the cost. Partially telescopic rails can also accept some moment loads.



For the load ratings to apply the structure to which they are mounted must be rigid and not distorted, and all the fixing holes for the mounting screws should be used.

Increasing the stroke

The stroke of many of the rails can be increased slightly from the standard.

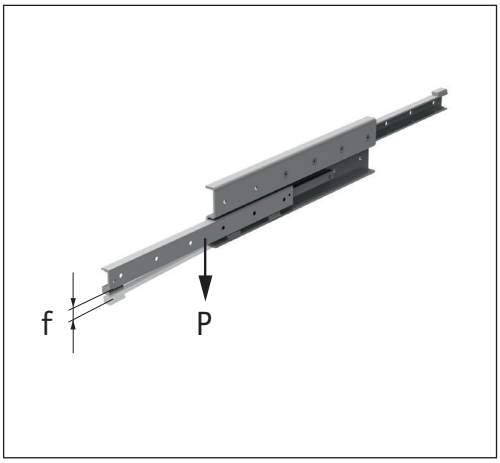
This is achieved by reducing the length of the ball cage in the rail. This will have the effect of reducing the load capacity of the rail - in this case for a correct load rating please consult our Technical Department.

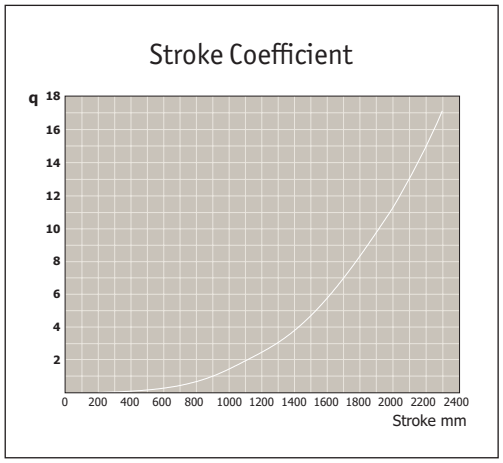
Typically a 100% stroke rail can be increased to a maximum stroke of 130% (of the closed length of the rail) and a partial extension stroke rail (50% extension) can be increased to a maximum of 65%.

Please see the table in the technical pages which shows how special stroke rails can be specified.

Deflection

The maximum deflection allowed should also be considered.





If the load P acts vertically on the rail, then the expected elastic deflection of the individual telescopic rail in the extended state can be found by:

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

f = expected elastic deflection (in mm)
q = stroke coefficient (see graph)
t = factor depending on the model of the telescopic rail (see below)
P = actual load acting on the centre of a rail, in N

L1984.28	t = 180	L1986.63	t = 540
L1984.35	t = 470	L1988.22	t = 3
L1984.43	t = 800	L1988.28	t = 8
L1984.43	t = 4000	L1988.35	t = 13
L1986.22	t = 8	L1988.43	t = 56
L1986.28	t = 17	L1992.LTF44	t = 25
L1986.35	t = 54	L1985.43	t = 3500
L1986.43	t = 120	L1985.43	t = 800

Note: This formula applies to a single rail. When using a rail pair, the load of the single rail is $P = P_1/2$. 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 series, the deflection is almost completely determined by the rigidity (i.e. by the moment of inertia) of the adjacent construction.

Technical Information

Special strokes

Example of a special stroke

Product series	Maximum stroke as % of closed length
L1984	130%
L1986	130%
L1988	130%
L1994	65%

E.g. a standard stroke for L1984.435-0070 is 796mm.

This can be increased to 130% of 770 i.e. 1001 mm, but is limited by the factor in the table below (in this example the stroke modification is 30mm):

Standard stroke: 796mm

Stroke modification: 30mm (ball spacing)

e.g. extra ... 826, 856, 886, 916... 976

Therefore the part number for the maximum stroke would be:

Special strokes

Special strokes are defined as deviations from standard stroke l_2. Increasing the stroke involves reducing the length of the ball cage and number of balls. This in turn reduces the rail load capacity. To confirm the reduced rail load capacity figures, please contact our Technical Department.

These values are dependent on the spacing of the ball cage (i.e. by reducing the number of balls the stroke can be increased).

Type	Size	Stroke modification mm
L1984	28	19
L1986	35	24
L1988	43	30
L1994	28	9,5
	35	12
	43	15

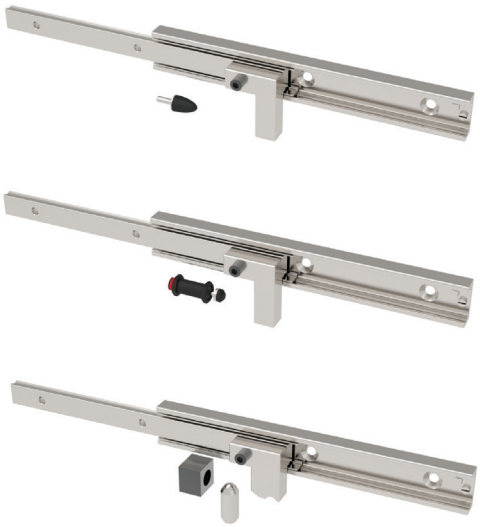
No stroke modification is possible for series L1984 and L1985. Each stroke modification influences the load capabilities stated in the catalogue. It can happen that after a stroke modification, important fastening holes are no longer accessible. For more infomation, please consult our Technical Department. Stroke modification of series L1996 on request.

ov-telescopic-rail-special-strokes-lnh - Updated - 07-03-2023

External stops

On many of our rails, light duty end stops are built into the rail. These are only to stop movement when not loaded - they are not designed to stop a moving, loaded slide.

External end stops must be designed into systems to prevent any damage to the telescopic rails (some examples are shown below).



Rubber bumper stop

Shock absorber stop

Fixed stop with spring plunger

Locking systems

For the L1984 series telescopic rails, there is an optional locking system unit (for locking in the closed position). This would be used for example in transport sector applications (military, rail etc.) where there is often a need to have the slide locked off during vehicle movement.

For locking in the up position (if required) customers design their own locking system (in built in their designed structure).

Rigidity and alignment of structure

To get the best life, minimum rail deflection, and smoothness of movement, it is very important that the slides are installed (using all the accessible mounting holes) onto a rigid, parallel, plane structure.

The fixed and moving part of the slides assume the rigidity of the mounting structure.

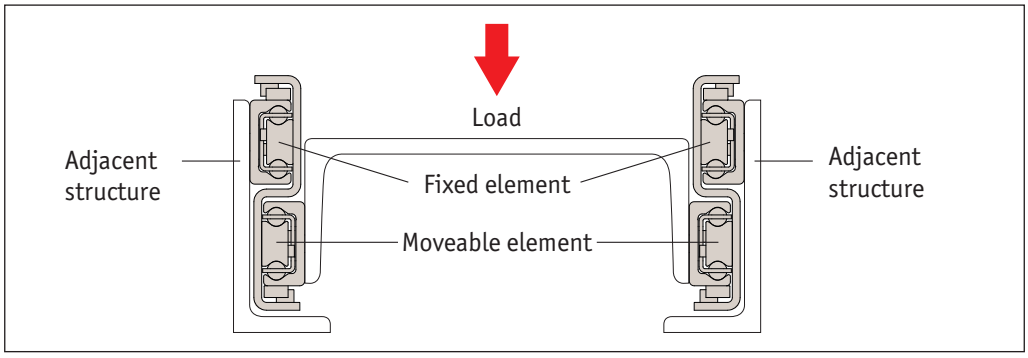
Lubrication

Recommended lubrication intervals are heavily dependent upon the ambient conditions, speed and temperature. Under normal conditions, lubrication is recommended after 100 Km of 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, e.g. lubricant with FDA approval is available for use in the food industry.

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 onto a rigid and level surface. When using two telescopic rails, please observe the parallelism of the installation surfaces. The fixed and moveable rails fit to the rigid assembly construction.
- Our telescopic rails 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 may 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 sufficient to appropriately synchronise the ball cage offset. Otherwise, an additional maximum stroke must be planned regularly to ensure the correct position of the ballcage.

L1994

- The L1994 series accepts radial and axial loads as well as moment loads in all principle directions.
- Horizontal preferred (vertical application is possible, but prior to vertical installation, we recommend you consult our Technical Department).
- The installation of two partial extensions on a single profile provides a very high load capacity full extension, please consult our Technical Department.

L1986 and L1988

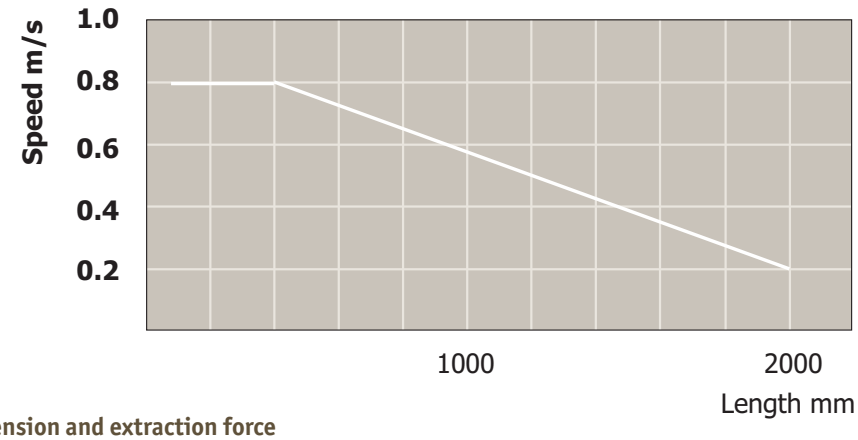
- The L1986 and L1988 series accept radial and axial loads.
- Horizontal preferred (vertical application is possible, but prior to vertical installation, we recommend you consult our Technical Department).

L1984, L1992, L1996, L1985 and L1989

- The L1984, L1992, L1996, L1995 and L1989 series accept radial loads. This should act in the vertical cross-sectional axis on the moveable rails.
- Horizontal preferred (vertical application is possible, but prior to vertical installation, we recommend you consult our Technical Department).
- When installing make sure that the load is placed on the moveable element (the lower rail). The opposite assembly negatively affects smooth movement and load capacity of the telescopic stroke.
- Installation must be done on a rigid, adjacent construction using all accessible fixing holes.
- Pay attention to the parallel alignment during assembly with a paired application.

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 the increasing length.



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 moveable rail must move against an inclined plane.

Double-sided stroke

For all designs allowing double-sided stroke, it must be carefully noted that the position of the intermediate element is defined only in the extended state.

In the extracted state, the intermediate element may protrude by half of its length on each side (with the exception of both the L1994 series, (which comes out as a partial extension without the intermediate element) and the custom design of series L1986 which can be supplied with special driving disc on request.

The double-sided stroke in series L1994, L1986 and L1988 is achieved by removing the set screw.

For series L1984 version D, the double-sided stroke is achieved with a special set-up so that two types of rails are shown in the catalogue L1986 (single extension) and L1986 (double extension).

The double-sided stroke for series DMS is available on request. Series L1984.DSB (locking version), L1985 and L1992 are not available with double-sided stroke.

Temperature range

- Series L1994, L1986, L1988 and L1992 can be used up to an ambient temperature of +170°C. A lithium lubricant for high operating temperature is recommended for temperatures above 130°C.
- Series L1984 and L1985 have a useable range of -30°C to +110°C due to the rubber stop.

Service life

The service life is defined as the time span between commissioning and the first fatigue or wear indications on the raceway. 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), so the service life consists of:

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

L = calculated service life in Km
δ = load capacity factor in N (see tables on following pages)
W = equivalent load in N
f_i = application coefficient

Application coefficient f_i

Operating conditions	Safety factor (.fi)
Neither shocks or 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 ($f_i = 1$) is 100Km.

For a single load P, the following applies: W = P.

If several external loads occur simultaneously, the equivalent load is calculated as follows:

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

Static load

The telescopic extension of the various series accept different forces and moments loads.

During the static tests the radial load capacity, C_{0rad}, the axial load capacity, C_{0ax}, and the 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

Basic parameters of the application	Safety factor, z
Neither shocks or 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, 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, z, at the most.

$$\frac{P_{0rad}}{C_{0rad}} \le \frac{1}{z} \quad \left| \quad \frac{P_{0ax}}{C_{0ax}} \le \frac{1}{z} \quad \right| \quad \frac{M_1}{M_x} \le \frac{1}{z} \quad \left| \quad \frac{M_2}{M_y} \le \frac{1}{z} \quad \right| \quad \frac{M_3}{M_z} \le \frac{1}{z}$$

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

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

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

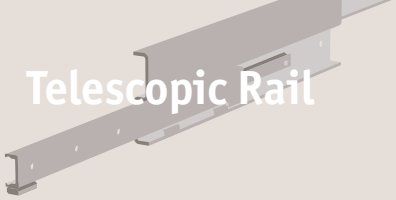
Technical Information

Load capacity factor δ

Length mm	L1984		
	28	35	43
	δ N		
290	863		
370	1164	1533	2288
450	1466	1892	4055
530	1768	2540	3120
610	2078	2878	3929
690	2381	3217	4197
770	2684	3881	5010
850	3180	4218	5836
930	3474	4555	6090
1010	3778	5226	6916
1090	4081	5561	7750
1170	4384	5897	7646
1250	4896	6573	8829
1330	5193	6907	9077
1410	5496	7242	9909
1490	5806	7920	10746
1570		8253	10988
1650		8588	11825
1730		9268	12665
1810			12904
1890			13743
1970			13983

Data to be used for service life (L_{Km}) calculations.

Telescopic Rail from Automotion Components



Length mm	L1986 and L1988		
	28	35	43
	δ N		
130	357		
210	655	614	923
290	1153	1211	1687
370	1456	1552	1974
450	1759	1892	2764
530	2063	2540	3580
610	2372	2878	4414
690	2675	3217	4661
770	2979	3881	5493
850	3487	4218	6335
930	3783	4555	6572
1010	4086	5226	7411
1090	4388	5561	8257
1170	4691	5897	8489
1250		6573	9332
1330		6907	9568
1410		7242	10409
1490		7920	11255
1570			12105
1650			12330
1730			13178
1810			13406
1890			14252
1970			14483

Data to be used for service life (L_{Km}) calculations.

Telescopic Rail from Automotion Components

Technical Information

Load capacity factor δ

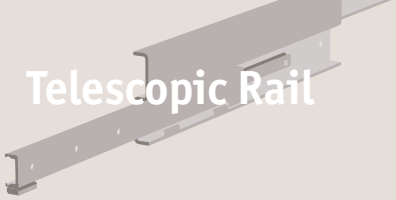
Length mm	L1985
	43
	δ N
770	5160
850	5306
930	5424
1010	5522
1090	5605
1170	5675
1250	5736
1330	5789
1410	5836
1490	5878
1570	5915
1650	5948
1730	5978
1810	6005
1890	6030
1970	6053
2050	29341
2130	28763
2210	30595

Data to be used for service life (L_{Km}) calculations.

Length mm	L1992
	43
	δ N
200	163
225	191
250	215
275	243
300	267
325	295
350	319
375	347
400	372
425	400
450	424
500	476
550	529
600	581
650	633
700	686
750	738
800	791
850	843
900	896
950	948
1000	1000

Data to be used for service life (L_{Km}) calculations.

Telescopic Rail from Automotion Components



Length mm	L1994		
	28	35	43
	δ N		
130	872		
210	1577	1533	2288
290	2692	2906	4055
370	3405	3721	4794
450	4119	4537	6602
530	4832	5990	8451
610	5557	6803	10325
690	6271	7617	11005
770	6984	9093	12877
850	8111	9903	14762
930	8811	10714	15429
1010	9524	12201	17310
1090	10237	13009	17981
1170	10950	13818	19860
1250		15311	21747
1330		16118	22411
1410		16925	24295
1490		18423	26186
1570			28083
1650			28733
1730			30626
1810			31281
1890			33172
1970			33829

Data to be used for service life (L_{Km}) calculations.

Telescopic Rail from Automotion Components

Technical Information

Fixing screws

Tightening torques of the standard fixing screws to be used

Property class	Size	Tightening torque Nm
10,9	28	8,5
	35	14,6
	43	34,7

L1985.43 roller telescopic slides

Size	Screw type	d_1	d_2	l_1	l_2	s
43	M8 x 16	M8 x 1,25	16	16	3	T40

The L1985.43 telescopic slide must be fixed with a custom design of Torx® screws with low cap head. The screws are included.

All other rails are fixed with countersunk or cap head screws as per DIN 7991 or 7984.
In size 63 of the ASN and DMS series, Torx® screws with low head cap screws are available on request.

Technical support

We have a team of experienced technical support staff. It is often the case that we can provide a more cost-effective solution than customers could do simply by selecting parts from the catalogue. Please don't hesitate to ask for advice which we will be happy to provide.

CAD models

To speed up your design process, most of our telescopic rails have corresponding 3D CAD files directly downloadable from our website in a full range of CAD formats.