

Gliding | Long travels



Recommended ratio of inner width B_i to bend radius R

The minimum inner width of an e-chain® on long travels depends on its bend radius. For particularly large bend radii on long travels, please consult igus®.

igus® specifies:

$$B_{i \min.} \geq R/4$$

$$L_K = S/2 + K2$$

L_K = e-chain® length

S = Length of travel

$S/2$ = Half length of travel

R = Bend radius

ΔCL = Offset fixed end

H_{Ri} = Trough inner height

H_2 = Installation height with lowered mounting

D_2 = Over length for long travels gliding

$K2$ = Add-on with lowered moving end



Advantages for lowered moving end

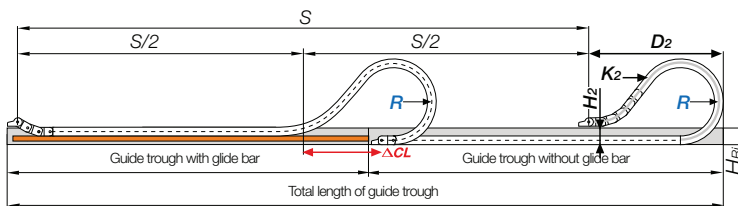
- Space-saving
- Longer travels
- Longer service life



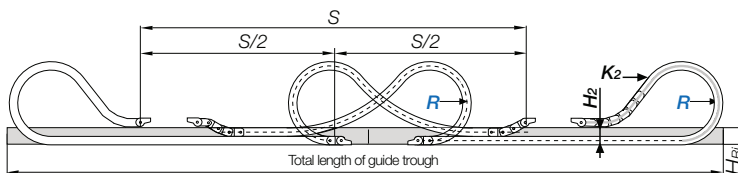
Example of lowered moving end



Long travel with an energy-efficient rol e-chain® - saving drive power

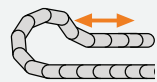


Schematic showing the function of an e-chain system® on a gliding application. The fixed end of the e-chain® is located in the centre of the travel distance



Configuration involving two opposed e-chains®. For a configuration involving two opposed e-chains®, the travel is measured as shown and can be used when there are high loads or restricted space

Gliding | Long travels



We recommend pivoting mounting brackets for gliding applications

Advantages for long travel applications with igus® e-chains®

- Travels over 1,000m
- 6m/s speed (up to 10m/s possible after consultation with igus®)
- Fill weights up to 70kg/m
- Service life of 10 years and more with igus® e-chain systems®
- More than 20 years of continuous improvement of the igus® rol e-chains® for long travels and reduced drive force

Further advantages compared to alternative technologies

- Many different types of cables and hoses can operate side by side in the same system (i.e. electrical, data, fibre optic cables with hydraulic and pneumatic hoses).
- Space-saving installation
- Quiet operation
- High accelerations
- Durable in wind, weather, dirt and chemicals
- Simple assembly of the modular system on the spot
- Rapid assembly and replacement of cables and hoses



E4 e-chain® with extension links for many cables and large hoses on a long travel application

Design assistance, free of charge

We recommend that igus® calculate every gliding application for you. We will always offer the most cost-effective solution, taking the technical requirements and operating safety into consideration.

To be able to advise you accurately, we require the following specifications:

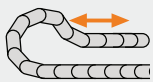
- Travel [m]
- Travel speed [m/min] or [m/s]
- Acceleration [m/s²]
- Fill weight [kg/m]
- Maximum cable/hose outer diameter [mm]
- Type and number of cables and hoses
- Required bend radius [mm]
- Cycle frequency (n/day or n/hour)
- Technical environment



Please call us and within hours you will receive a detailed system proposal. Within hours you will receive a detailed system proposal



Extremely long travels with rol e-chains® and chainflex® cables (here 615m)



Gliding | Long travels



If the fixed point is in the centre of the travel, use half of the guide trough with glide bars and the other half without glide bars



Various guide trough systems are available

► Page 1298

Long travels with igus® guide troughs

Guide troughs allow igus® e-chain® and e-tubes to continue smooth, low-friction operation in long travel applications. Principle sketches are shown on this page. The height of the trough must be at least twice that of the e-chain® height. The sides must provide a chamfered opening. The trough inner width is the same as the e-chain® outer width, plus 4mm (on igus® Aluminium SuperTroughs) $B_{Ri} = Ba + 4$. Along the side of the trough, where the upper run cannot glide on the lower run, glide bars must be installed. We recommend the use of polymer glide bars from igus®. They are optimally matched to the e-chain® material and offer the lowest values for friction, noise and wear. Guide troughs with and without glide bars can be obtained from stock for almost all igus® e-chains®. Important: When assembling the trough parts, the following points must be

given particular attention: ● Properly align all trough parts upon installation ● All screw heads should be flush with the trough ● Smooth level transition between the end of the e-chain® and the glide bars ● Solid connection with the glide surface. These points must be observed when using assembly-friendly igus® guide troughs.



- Ba = Outer e-chain® width
- Bi = Inner e-chain® width
- ha = Outer e-chain® height
- H_{Ri} = Trough inner height
- B_{Ri} = Inner trough width depending on Ba

Aluminium SuperTrough

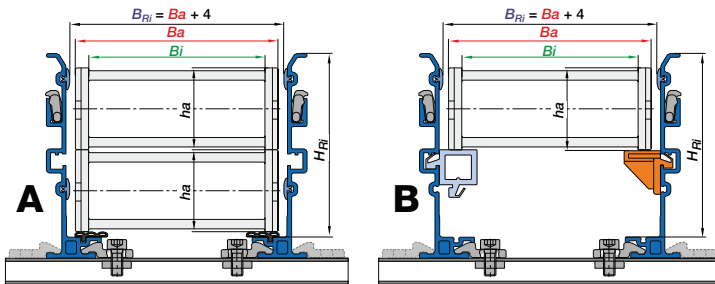
$$H_{Ri} \geq 2 \times ha$$

$$B_{Ri} = Ba + 4$$

Steel guide trough

$$B_{Ri} = Ba + 5$$

- Alu SuperTrough set
- Glide bar
- Installation set basic
- C-profile



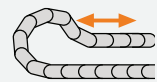
- A)** Guide trough without glide bars - upper run glides on the lower run
- B)** Guide trough with glide bars. The upper run glides on the glide bars from the middle of the travel. We recommend the use of igus® polymer glide bars. They are optimally matched to the e-chain® material and offer the lowest values for friction, noise and wear (Illustration on the right, orange with the new high-speed glide bar, super aluminium trough series 973/974/975)

Glide friction values for e-chains® made of igumid G and various glide bars

igus® igumid G	igus® polymer glide bar	Galvanised steel sheet	Anodised aluminium	AISI 304 stainless steel (material: 1.4301)
Coefficient of friction dynamic	0.19	0.45	0.54	0.48

Source: igus® lab

Gliding | Long travels



Corrosion-free igus® guide troughs are available in the material:

- Galvanised steel
- AISI 316Ti/AISI 316L stainless steel material 1.4571/1.4404 upon request
- Seawater resistant aluminium



Automated storage/retrieval system with system E2 and chainflex® cables - travel lengths up to 80m and speed of $v = 4.5m/s$

Travel speeds and accelerations

Travel speeds up to 6m/s in continuous operation are possible and in use on current applications. In special cases, up to 10m/s possible after consultation with igus®. For example, E4 e-chains® achieve speeds of 22m/s and accelerations of 784m/s² in crash test units. In these cases, however, only a few thousand cycles are required per year. Acceleration plays a crucial role in the life calculation. Differentiations must be made between normal operational acceleration and a sudden jolt of acceleration such as unexpected stops or so-called "E-stops." Even in these situations, igus® e-chains® prove to be very durable. It is important to get the correct design support from our engineers.

Service life

We offer service life calculations for your application based on our extensive gliding application experience. As developers of polymer plain bearings, we possess vast material behaviour knowledge which we apply to the development of e-chains® as well. Units with 200m travels have been in operation for 8 years with minimum maintenance. Units up to 60m travels have been in operation for 15 years with almost no maintenance. Please consult igus® for references and calculations for your project. The maintenance-free aspects of igus® e-chain systems® over long periods and under harsh operating conditions is often the deciding factor in choosing igus®. Our system guarantee (depends on the application) provides additional peace of mind.

Technical environment

Long travel applications using igus® e-chains® run in water, in dirt, in the tropics, in explosion risk areas (with special design features) and many other conditions. You will find more details in the Technical Environment section of this chapter. Guide troughs can be supplied in corrosion-free materials.

Calculation

Comprehensive tests place us in the position of knowing our products capabilities. Important factors in these tests are: ● Push/pull forces under both ambient and extreme temperatures ● Humidity and dirt ● Friction values of the polymers, alone and against various glide surfaces ● Behaviour of electrical cables under push/pull conditions ● Behaviour of hydraulic and media hoses under push/pull conditions ● Service life, and noise generation. If we cannot calculate your application based on these factors, we can carry out a test for you in our laboratory. Please consult igus®.

Technical data - gliding applications

Travel max.	600m - 800m	
v max.	10m/s	
a max.	50m/s ²	Depending on the application, please check with igus®
Fill weight max.	70kg/m	Depending on the application, please check with igus®



Long travel "off the reel." Up to 100m travel pre-assembled and ready to install