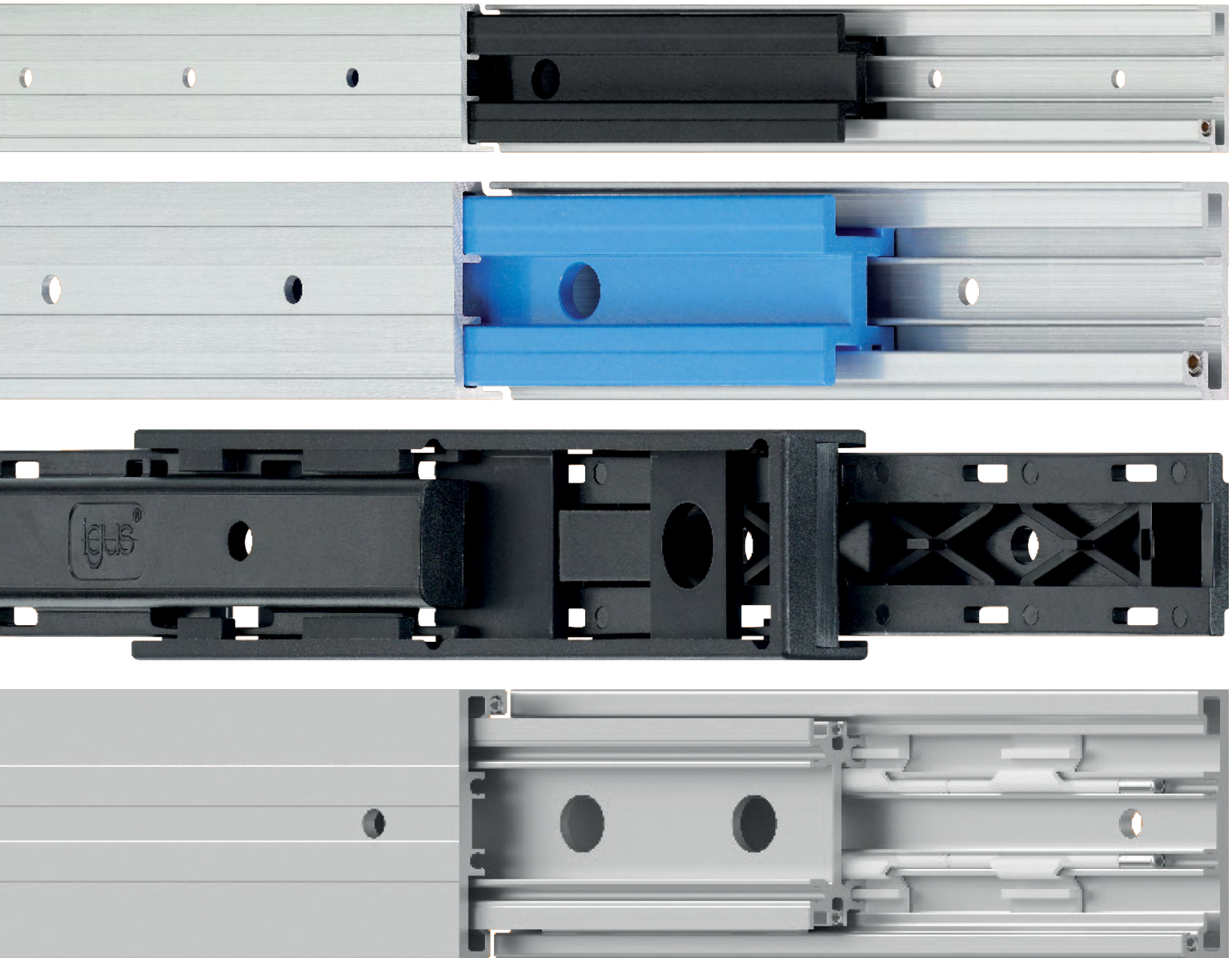
Telescopic rails solutions & benefits

Key advantages of modern grease-free sliding systems

Introduction

Telescopic rails are key components for linear movements in numerous technical applications, from machine paneling and control panels to extensions in vehicles or medical technology. They play a key role when it comes to accessibility and space optimization in different application scenarios.

This white paper provides an overview of the leading solutions in this field, focusing on the technical specifications, areas of application, and differentiating features of the various technologies. Particularly noteworthy are modern developments such as the grease-free, slide-guided telescopic rail from igus, which sets new standards in maintenance-free operation, hygiene, and lightweight construction.

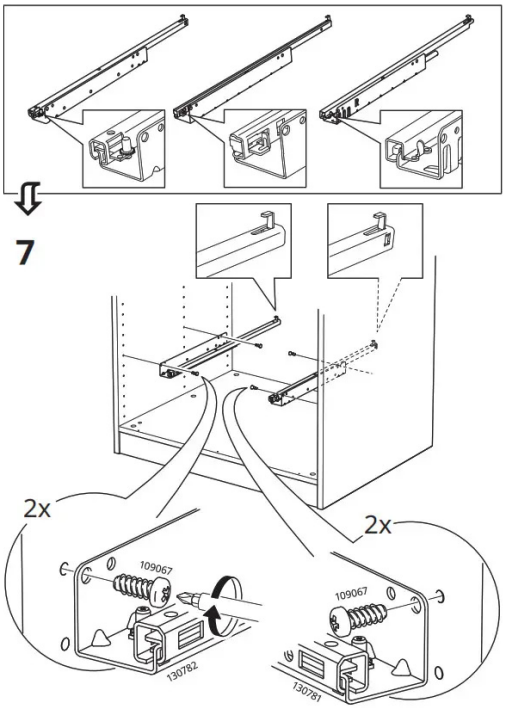


Differentiation
from classic linear guides

Telescopic rails enable linear movement with defined extension and unsupported length. They are ideal for applications where accessibility and space-saving are crucial.

They are used in machine tools, control panels, vehicle pull-outs, medical technology, and furniture construction. Most people have probably held a telescopic guide in their hands at least once in their lifetime. Consider, for example, assembling a chest of drawers from a major Swedish furniture manufacturer. The most well-known use for telescopic rails is still for extending drawers

Feature	Telescopic rails	Linear guides
Movement	Extendable over several elements (partial, full, over-extension)	Continuous movement along an axis
Accessibility	Ideal for applications with access to drawers, panels etc.	Ideal for precise, repeatable movements
Load-bearing behaviour	Good for axial loads, limited for torques	Very good with centric load, sensitive with off-centre load
Guide system	Mostly ball cages, rarely plain bearings	Recirculating ball bearing carriage or plain bearing
Typical applications	Extensions, machine panelling, vehicle technology	Automation, CNC, handling systems

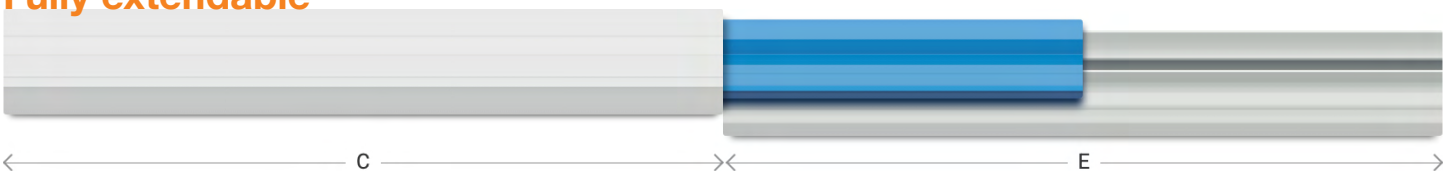


Extract from an assembly instruction
Source: Ikea

Installation positions

The following installation positions and cases apply to telescopic systems.
These influence the load capacity and ease of use.

Fully extendable



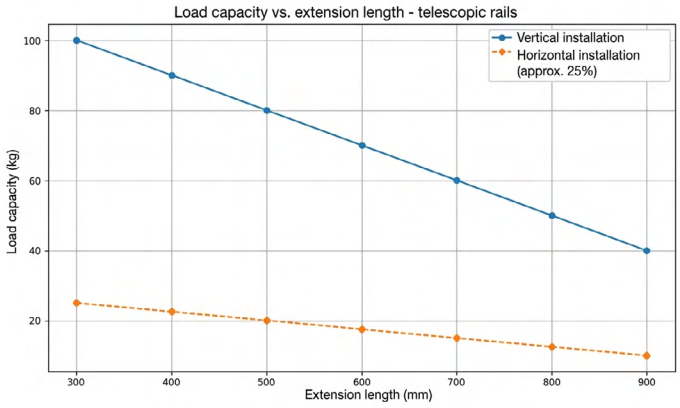
Partial extension

Over-extension

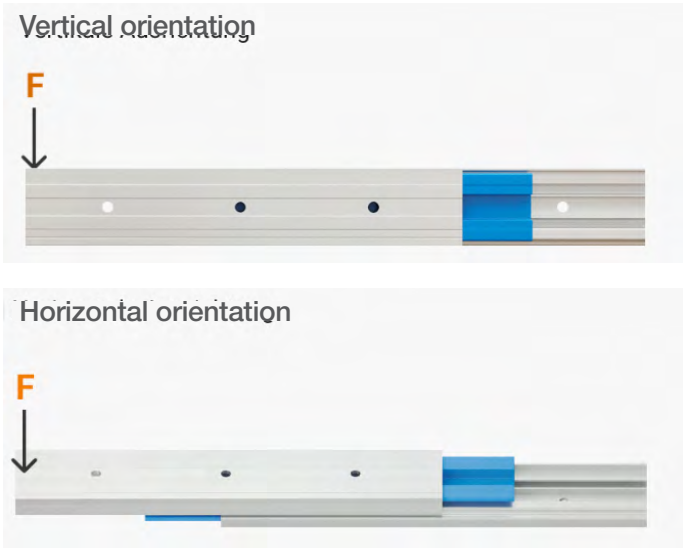
The most common installation position is vertical alignment with two parallel telescopic rails, i.e. the classic drawer extension. The permissible weight in the application is doubled when the load is positioned in the center.

The load capacity is often reduced to around 25% with a flat (horizontal) assembly.

As a general rule, the longer the extension, the lower its load capacity, service life, and ease of use.



The graph shows an example of the load curve for purely metallic extensions.



Source: igus®

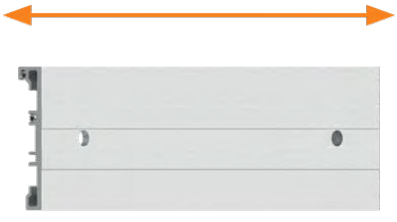
Special case:
extendable from both sides

Telescopic rails that can be extended from both sides not only offer expanded application possibilities, but also significant added value in terms of flexibility and functionality.

Unlike conventional telescopic rails, which can only be moved in one direction, telescopic rails that can be extended from both sides can be moved in two directions, considerably increasing their versatility.

This special design opens up new application possibilities and makes this type of telescopic rail particularly interesting for areas where maximum flexibility and efficiency are crucial. Typical application areas include industrial machinery and systems with limited space, maintenance bays, server cabinets, medical equipment, and furniture or storage solutions with access from both sides.

Almost all manufacturers — including igus — offer a solution for this application in their portfolio.



Classic areas of application for telescopic rails

Telescopic rails are used in numerous industries where linear movements with limited installation space and high stability are required.

In industry, they are used for machine paneling, tool extensions, and control panels. In medical technology, they ensure quiet, hygienic movements for appliances and drawers. In vehicle construction, they enable robust extensions for cargo hold solutions or mobile workstations.

They are also used in the furniture industry for high-quality drawer runners. Other applications can be found in laboratories, vending machines, logistics systems, and wherever accessibility, freedom from maintenance, and compact design are crucial.

Industry

- Tool extensions
- Machine safety doors
- Storage racks

Vehicle Technology

- Equipment carriage
- Battery compartments
- Charging levels

Medical Technology

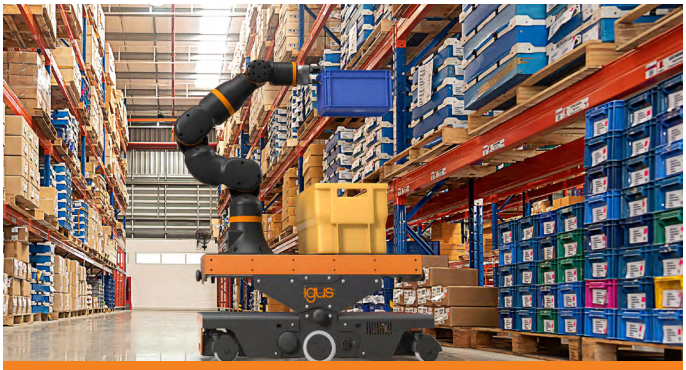
- Drawers
- Imaging systems
- Examination tables

Laboratory

- Sample cooler
- Equipment cabinets
- Extraction systems

Furniture

- Drawers
- Keyboard extensions
- Extendable tables



Automation

- Gripper arms
- Operator panels
- Linear axes

Food Industry

- Conveyor systems
- Cleaning systems
- Paneling

Special Applications

- Railings
- Vehicles conversions
- Canopies

Specific advantages of optimized sliding solutions

Maintenance-free & grease-free

Completely grease-free thanks to integrated solid lubricants in the plastic. Hygienic and clean — ideal for the food and medical industries.

Dirt & corrosion resistance

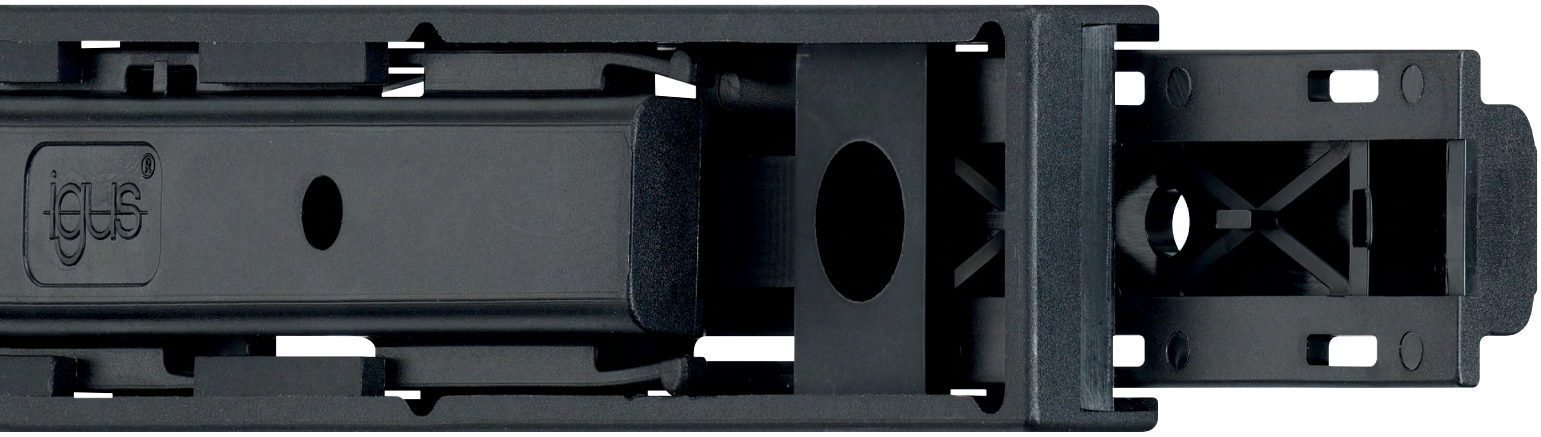
Anodized aluminum guide rails are highly corrosion-resistant, and plastic elements are completely corrosion-free and resist dirt and dust — perfect for damp or aggressive environments

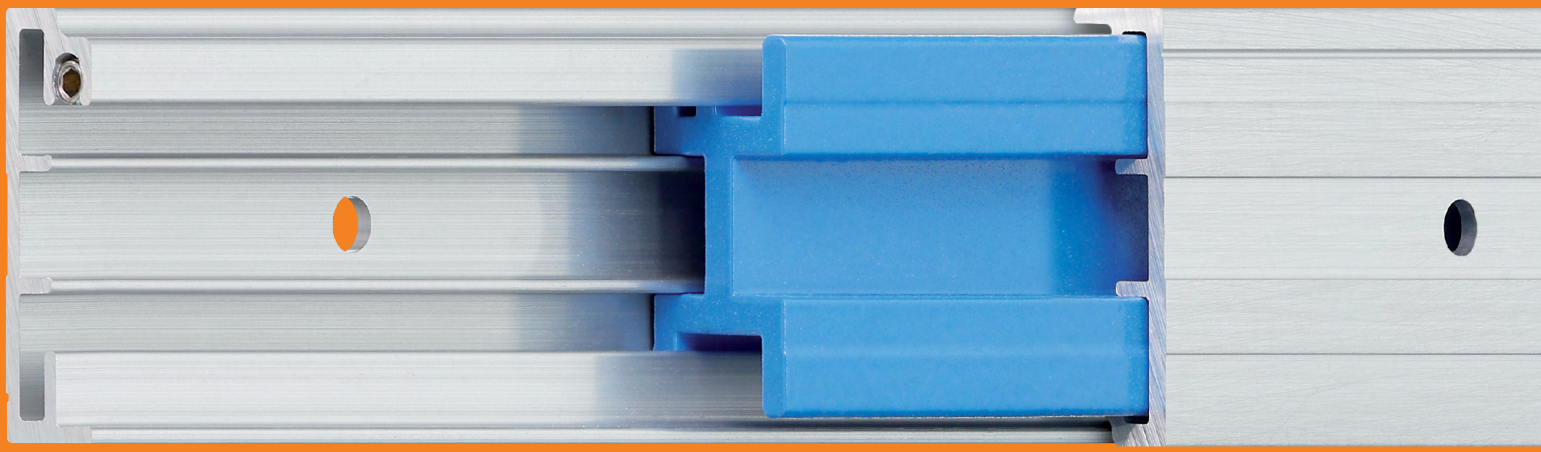
Noise comparison

Significantly quieter than metallic guides with ball bearings — ideal for noise-sensitive applications such as medical technology or mechanical engineering.

Weight

Up to 75% lighter than metal rails. High-performance polymers facilitate assembly and reduce system weight — ideal for mobile applications.





Service life

Wear-resistant sliding elements made of high performance polymers ensure a long service life and minimize maintenance costs.

Freely configurable

Extension lengths from 125mm to 2,000mm, configuration accurate to the millimeter, selectable engagement points, no minimum order quantity.

Pre-load

(not necessary for ball bearing solutions)

Spring-loaded mechanism prevents rattling — strong and stable against vibrations, protects against spillages in laboratories and production environments.

Aesthetics

Simple, functional design with black or silver anodized aluminum profile — reduces light reflections, visually discreet.

Temperature-resistant

Options with temperature resistance up to 266°F (130°C) — suitable for high-temperature environments such as ovens or drying systems.

Cleaning

Dirt-resistant and easy to clean — extends service life and ensures hygienic operation. Cleaning by steam jet is possible.

Weight difference

A decisive factor in the choice of material for telescopic systems is the weight, especially in applications where the environmental impact is to be reduced through lightweight construction. Telescopic systems made of steel, as used in conventional designs, offer a high load-bearing capacity and stability, but are comparatively heavy. Aluminum telescopic systems, such as those offered by manufacturers like igus are a much lighter alternative.

Aluminum has around a third of the density of steel, which means that the total weight can be reduced by up to 50–60%on average compared to steel without compromising the basic stability to the same extent, especially thanks to modern profile geometries.

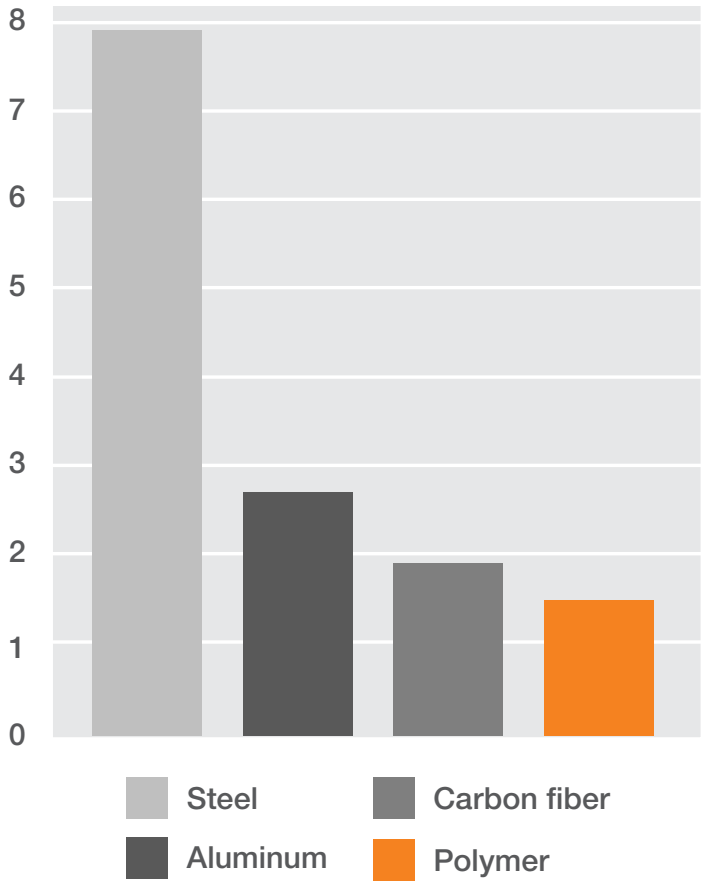
Density comparison of different materials

drylin linear bearing systems are largely based on guide rails made of coated aluminum. The linear systems are supplemented by sliding elements made of plastic. This combination guarantees low mass for easy handling. Carbon and fiberglass guides have also been used in individual cases.

Telescopic systems made of 100% plastic, also offered by igus, are even lighter. Compared to aluminum and steel, plastic systems offer the greatest weight reduction — here the weight can be reduced by up to 70–80% compared to steel, depending on the specific plastic and the design. However, these systems are typically only available in fixed lengths and are primarily suitable for applications with moderate to low loads. Plastic telescopes also eliminate the need for surface treatment. However, their use is limited by short lengths and a lack of precision.

The choice of material depends on the requirements of the respective application. While steel remains the first choice for high loads, aluminum and plastic systems enable innovations in weight-sensitive areas such as automotive engineering, medical technology, and mobile devices thanks to their lightweight construction.

Proven and tested



Source: igus®

Sustainability

PTFE FREE

Self-lubrication

In igus telescopic systems, self-lubricating sliding elements made of high-performance polymers ensure long-lasting, clean, and maintenance-free operation. These elements are homogeneously interspersed with solid lubricants, ensuring uniform lubrication over the entire service life without the need for external lubricants. Alternatively, the aluminum center rails are coated with high-performance plastics.

PTFE

As a sustainable option, the telescopes can be supplied in PTFE-free and PFAS-tested versions. This meets the growing demands for environmental and health compatibility. The aluminum rails used are REACH and RoHS-3-compliant and therefore support sustainable and legally compliant product design. The use of PTFE-free and PFAS-tested plastic not only contributes to environmental and user safety, but also meets the future standards of modern industrial applications.

PFAS TESTED

Electrical insulation

Electrical enclosures

Insulating components are safer in switch cabinets or electrical devices where conductive rails could cause short circuits. Plastic guides eliminate this risk.

Medical devices

Devices such as X-ray scanners or analyzers that contain sensitive electronic components benefit from electrically insulating components to prevent interference and damage.

Automation & robotics

In automated machines, insulating rails ensure that the moving components do not create any electrical connections between different parts of the machine.

Electronic test stations

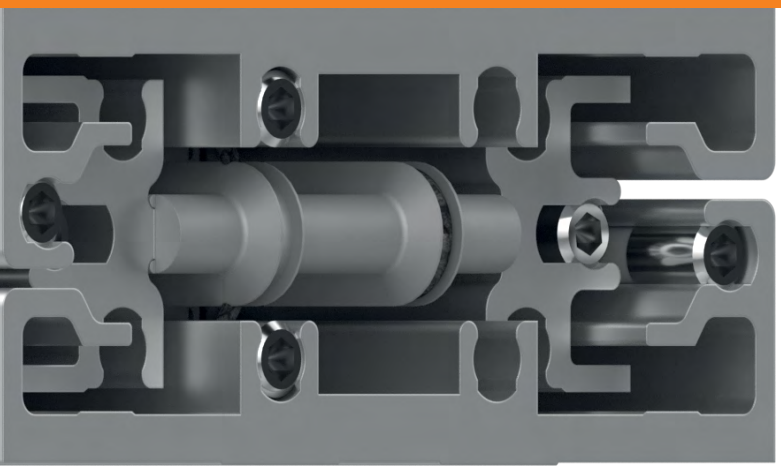
In facilities where electronic components are tested, an electrically insulating guide is important to ensure that no accidental electrical currents flow.

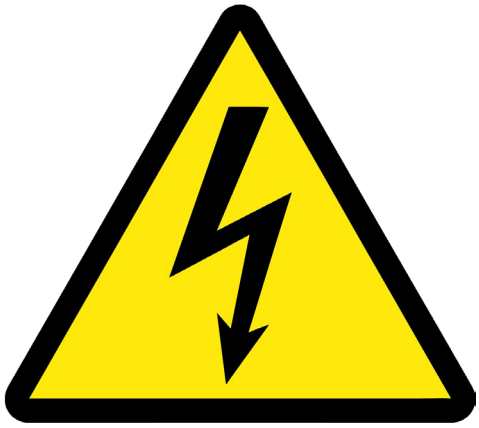
igus telescopic rails are, depending on their design, electrically insulating and therefore differ fundamentally from conventional metal guide systems, which are electrical conductive.

If the entire telescopic system, or even just the center rail, is made of non-conductive plastic, electrical flow is interrupted. Electrically insulating systems then offer several advantages:

- Avoidance of short circuits
- Greater corrosion resistance
- Thermal insulation

The electrically insulating specifications of the non-conductive telescopic rail guides can be an advantage in many applications, especially in those where electrical safety, corrosion protection, or certain material specifications are required. Here are a few examples:





Vehicle construction

In electric vehicles or vehicle-related applications, electrically insulating parts can help to prevent faults in the vehicle wiring or electronics.

Medical & laboratory

For highly sensitive electronic devices in laboratories, insulation helps to avoid electromagnetic interference.

Railway sector

In trains with electrical control and power systems, electrically insulating material reduces the risk of electric shocks and increases safety.

Battery & chip production

Electrically insulating guides prevent conductive components from inadvertently conducting current and potentially damaging the electrical control system. As battery cells also contain highly reactive materials, efforts are being made to protect against short circuits.

Manufacturing process
of telescopic systems from sheet metal

Cost-effective telescopic systems made of sheet metal are technologically sophisticated products. Their manufacture is based on cost-efficient production processes and automation. Below you will find a description of the typical processing steps and aspects that contribute to cost efficiency.

1. Material selection

Cold-rolled sheet metal is usually used as it is cost-effective and easy to form. Cold forming improves the strength and increases the surface quality.

Sheet metal in rollers enables continuous processing (coil-to-part), which reduces material waste and increases production speed.

2. Cutting to size

Sheet metal is removed from the rollers (coil) and cut to the required length. This is often done with powerful cutting tools, such as knives or roll cutters.

These processes are carried out at high speeds and with as little waste as possible.

3. Stamping

Stamping is the most important processing step. Holes, cut-outs, and special features (assembly slots, holes, guides, etc.) are punched into the sheet metal. High-precision punching tools in combination with hydraulic or pneumatic presses enable fast process times and consistent quality.

Stamping technology is particularly economical for large pieces, as the tool costs are amortized through mass production. However, the process does not offer a high degree of flexibility; lengths cannot simply be varied. This explains the reason for cost-effective telescopic systems that are also limited to fixed lengths.

4. Bending & molding

After stamping, the sheet metal parts are bent into the desired shape using press brakes or roll bending processes. The bending process produces the “U”- or “C”-shaped profiles required in telescopic extensions.

Continuous bending (e.g. by roll forming) is faster and more cost-effective than individual bending. It also allows the processing of long workpieces that are cut later.

5. Heat treatment (optional)

Depending on the application, certain components can be hardened or stress-relieved to increase strength or prevent distortion. Heat treatments are only carried out if they are truly necessary in order to reduce costs.

6. Surface finishing

The components are galvanized (e.g. zinc coating) or powder coated to ensure corrosion protection. These are proven and cost-effective methods.

7. Assembly

The assembly of telescopic systems comprises several central components: main profiles made of moulded sheet metal with a C or U cross-section, ball bearing rails, balls or rollers made of steel or plastic, as well as spaces and end pieces for guidance. Stop dampers for self-closing applications can be added as an option.

During the assembly process, the balls or rollers are inserted into the ball bearing guides and these are assembled between the steel profiles. The precise positioning of the balls ensures even load distribution and reliable operation of the telescopic guide.

Modern production facilities often use automated systems to insert and connect components. This increases efficiency and reduces the effort rate, making assembly standardized and cost-efficient.

Production techniques such as riveting, pressing, or laser welding ensure durable connections.

Production
of a telescopic system from igus®

The manufacture of telescopic systems from igus is based on a modular approach that focuses on the use of high-quality extruded aluminum profiles and innovative plastic slide elements. The process combines precise mechanical manufacturing techniques with flexible customization options to meet individual customer requirements.

1. Material

The central element of the system is the extruded aluminum profile. This is additionally subjected to heat treatment (artificial aging) in order to reduce residual stresses and optimize mechanical specifications such as strength and stability. The surface of the profile is then anodized, which not only provides improved corrosion protection, but also enhances the sliding properties of the system.

2. Machining the profiles

CNC machining centers are used to drill the necessary holes, which are used either for assembly or for the optional locking functions. The high-precision machining allows the system to be customized, even for applications with special requirements. It is then cut to length according to customer specifications.

3. Installation of spacers

The spacers and end stops are customized to the desired length and inserted into the profile via screw channels. This method enables simple and flexible assembly, which can also be modified later if adjustments are required.

4. Integration of the sliding elements

A decisive difference to traditional telescopic guides lies in the use of plastic sliding elements instead of balls. The sliding elements ensure reliable, maintenance-free movement without the need for lubrication. Pretensioning elements can be integrated as an option to ensure smooth and even movement and are an advantage in applications with increased stability requirements.

5. Locking options

The telescopic system can be equipped with locking options that are defined at freely selectable positions in the system. This function not only offers flexibility in use, but also facilitates operation in dynamic or stressful scenarios.

6. Grease-free & modular design

In keeping with the core philosophy of igus, its telescopic systems are completely maintenance-free and require no external lubricants. All components are designed so that they can be easily replaced or modified. This makes it easy to dismantle and customize the system, similar to a modular system.

Conclusion

Telescopic rails are indispensable components when it comes to precise linear movements, optimal space utilization, and reliable functionality in a wide range of applications. Whether in industry, medical technology, automotive engineering, or furniture construction — their versatility, robustness, and user-friendliness make them an essential solution for designers, engineers, and project managers.

Particularly innovative technologies, such as the grease-free and highly corrosion-resistant drylin NT telescopic rails from igus set new standards in maintenance-free, hygienic, and lightweight construction. Such developments not only offer practical advantages such as reduced downtimes and simplified cleaning, but also address specific requirements such as use in wet or demanding environments.

When choosing the right solution, individual requirements in terms of load-bearing capacity, service life, and material properties should be taken into account in addition to technical specifications. The current variety of configurable telescopic rails opens up a wide range of options to achieve ideal results for every project.

Discover the advantages of modern telescopic rail technology and configure your ideal solution with the **igus telescopic rail configurator today!**