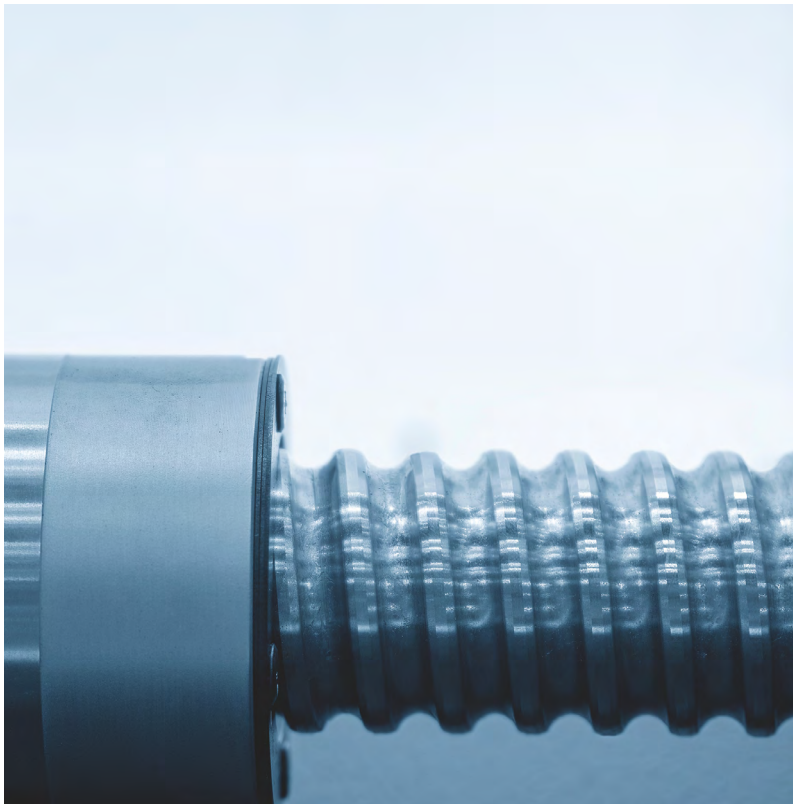


TUNAP INDUSTRY

High-performance lubricants for linear guides

Optimum lubrication in demanding applications

TUNAP
Quality with responsibility

Memberships and registrations as a sign of our commitment

As a lubricant manufacturer, TUNAP is aware of its special responsibility. We document our high standards of efficiency, environmental and health compatibility through various registrations and certifications.

H1 lubricants are used where there may be occasional or technically unavoidable contact with food products, e.g. during feeding, processing and packaging. Our products are registered with the NSF for use in the food, pharmaceutical and animal feed industries.

TUNAP's lubricants, cleaners and maintenance products fulfil the requirements according to:

✔ Halal labelling for products that are halal (permissible, permitted) according to Islamic law.

✔ Kosher Labelling for products that are classified as kosher (suitable, pure) according to Jewish dietary laws.

Certifications as a sign of quality

With ISO 21469 certification, TUNAP fulfils the most comprehensive hygiene requirements for the production of H1 lubricants. The international certification is the most demanding proof of safety, reliability and product responsibility. The standard requires a holistic consideration of the life cycle of a NSF H1 product. Strict regulation of the recipe regarding ingredients, production, handling, packaging, storage and use ensures the highest quality.

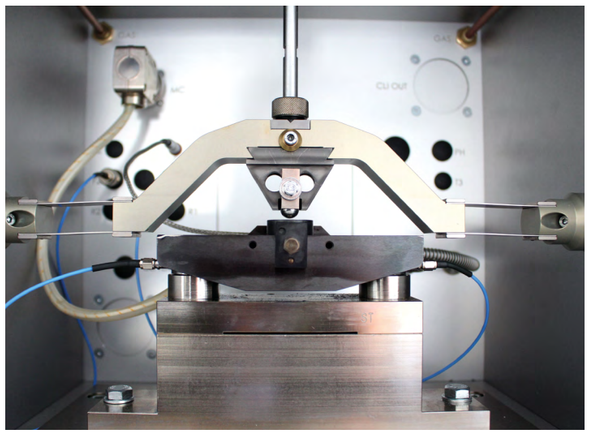
With two further certifications, TUNAP demonstrates a reliable quality and environmental management system. The commitment to sustainability is an essential part of TUNAP's corporate strategy, as evidenced by the ISO 14001 certificate. ISO 9001 certification attests to TUNAP's reliable quality management and ensures consistently high product and service quality.

TUNAP stands for passion and expertise. We advise you on the selection of the right products and support you with their implementation on site. As a lubricant expert with our own development and production facilities, we offer professional solutions for the challenges of lubrication, cleaning, care and maintenance in a wide range of industrial sectors.

In the application of linear guides, precise and reliable lubrication is crucial for the functionality and service life of the components. These systems are essential in many areas, whether in machinery and equipment, automation technology or the packaging industry. The challenge is to provide consistent lubrication that minimises friction and wear while protecting against contamination to ensure the precise movement of the linear guide. Failure or incorrect lubrication can lead to reduced performance and shortened service life or unplanned downtime, which has a significant impact on the efficiency and safety of the entire system.

The versatile application of linear drives in combination with the high demands on service life and precision make the use of specially matched high-performance lubricants essential. This is why TUNAP high-performance lubricants have been specially developed to fulfil the requirements of linear guides in different industrial environments. They not only reduce friction and wear, but also provide effective protection against environmental influences such as dust, moisture and temperature fluctuations. Our lubricants extend the service life of linear guides, improve operational reliability and help to increase overall performance, even under extreme operating conditions such as high loads or fast movements. They offer a sustainable solution to maximise the efficiency of your equipment and minimise downtime.

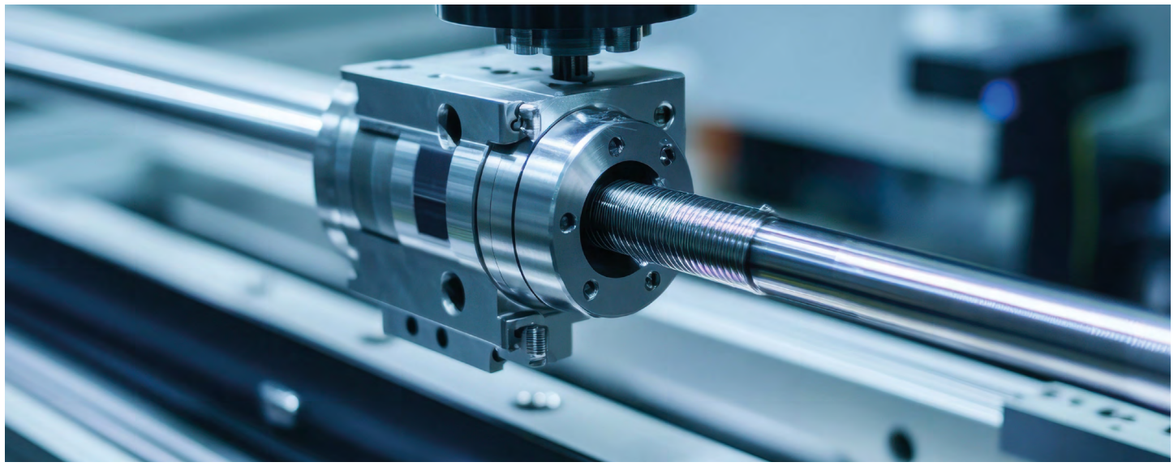
Together with our development and application engineering departments, we develop special products tailored to your requirements. With intelligent and customised solutions, we make an important contribution to health, resource conservation and economic efficiency. With an extensively equipped chemical-analytical laboratory and numerous model and component test benches, we ensure the performance of our products and round off our expertise.



TUNAP
Linear guides in drive technology

Linear guides are an indispensable component of many modern machines and systems. They enable precise, low-friction movements under high loads.

- ✔ In **mechanical engineering**, they play a central role in machine tools such as milling, turning and grinding machines, as they ensure the accuracy and stability of machining processes.
- ✔ Linear guides are indispensable in **automation technology** as they enable robots and automated conveyor systems to precisely position and move workpieces.
- ✔ They are also used in **medical technology**, for example in adjustable transport tables, where high stability and reliability are crucial.
- ✔ **Packaging machines** use linear guides to position and sort products precisely, making the packaging process efficient and error-free.
- ✔ In the **automotive industry**, they are used in production robots and assembly lines to precisely insert and fasten components.
- ✔ Finally, linear guides are also essential in **woodworking machines** such as CNC milling machines, as they ensure precise cutting and milling work that requires high accuracy in wood processing.



Linear guides can be divided into **driving** and **driven linear guides,** depending on whether they play an active or passive role in the motion chain.

Driven linear guides have an integrated drive that directly controls the movement of the guide. Linear motors or ball screws are usually installed here, which ensure precise and smooth movements and prove their worth in highly automated processes, as they do not require any additional drive components. This type of linear guide is often used in applications where precise control and a fast response time are required, for example in the semiconductor industry or in automated production systems.

Driving linear guides, on the other hand, are passive guides that are moved by an external drive. They are mainly used for stabilisation and guidance, while the movement itself is generated by a separate drive, such as an external linear motor or a pneumatic control unit. This type of linear guide is particularly suitable for simpler applications where high loads and low costs are paramount, for example in packaging machines or conveyor systems.

TUNAP lubricant solutions
For most demanding requirements

Our high-performance lubricating greases are specially tailored to the requirements of a wide range of industries and operating conditions, from the glass and heavy-duty industries to the food industry. The combination of high-performance thickeners such as calcium sulphonate, lithium or inorganic systems and precisely matched additives ensures that the lubricant is released as required even under extreme temperatures, high mechanical loads and continuous stress. The additives optimise wear and corrosion protection, adhesion, media and ageing resistance as well as load-carrying capacity. The result: extended maintenance intervals, higher energy efficiency and a significantly increased service life of your components, for long-term economical and trouble-free system operation.

Oil or grease - the right choice for every application

Reliable lubrication of linear guides is essential to ensure their smooth operation and long service life. It minimises wear, protects against corrosion and supports smooth motion sequences. Effective lubrication is based on the right decision between grease and oil lubrication. The choice between oil and grease depends on various factors such as the type of application, the operating environment and the desired maintenance intervals.

Grease lubrication is particularly suitable for applications where a long-lasting effect is required and the lubrication intervals should be as far apart as possible. Due to its good adhesion to surfaces, grease reliably protects against the penetration of dirt and moisture.

GREASE

Oil lubrication, on the other hand, is preferred for high-speed applications, as oil reduces friction due to its lower viscosity.

OIL

Viscosity and viscosity index - Key parameters for the lubrication of linear guides

The viscosity of a lubricant is the internal resistance that its fluid layers exert against each other when flowing. The higher the viscosity, the thicker the lubricant; the lower the viscosity, the thinner the lubricant. As viscosity changes with temperature, the so-called viscosity index is an important characteristic value. It indicates how stable the viscosity remains with temperature fluctuations. A high viscosity index indicates a constant viscosity over a wide temperature range.

The right choice of **viscosity** and **viscosity index** is crucial for linear guides. If a lubricant becomes too t h i n at operating temperatures, the lubricating film breaks off and no longer offers sufficient protection. If it is too viscous, the internal friction increases, which impairs efficiency. Only an optimally matched lubricant prevents wear, reduces friction, ensures reliable operation of the linear guide and extends the service life of the components in the long term.

Selection of the base oil viscosity depending on the speed

Low speed ‹ 15m/min	Medium speed 15-60m/min	High speed › 60m/min
Risk of increased wear		Risk of increased temperatures
High viscosity › 100 mm²/s	**Medium viscosity** ca. 100 mm²/s	**Low viscosity** ‹ 100 mm²/s

TUNAP technologies
Innovation and performance

TUNAP stands for **forward-looking product developments** and sustainable innovations that ensure greater efficiency and improved performance across all industries. Our mission is to make people‘s daily lives easier with a wide range of products for various industries and areas of application. We convince our customers with innovative product solutions, high-quality applications and a service that makes no compromises.

TUNAP OMC_2 additive technology

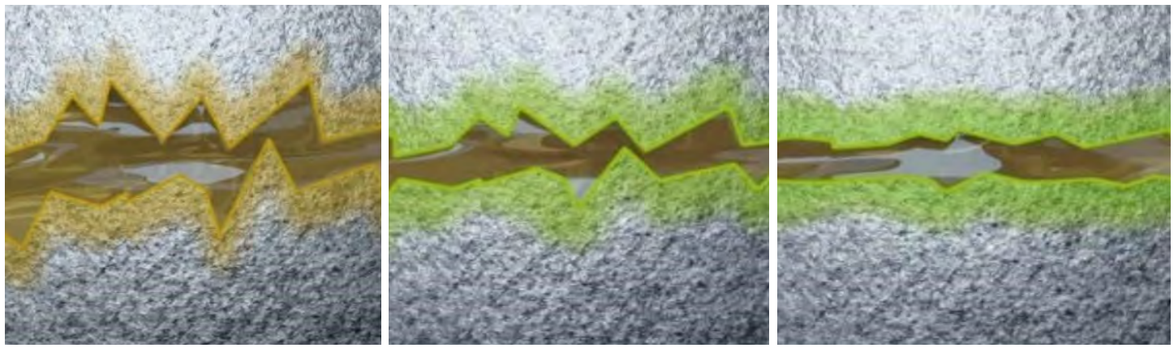
The active complex of the TUNAP OMC_2 additive technology (Organic Molybdenum Compound) changes the structure of metal surfaces through a special micro-smoothing effect. **This results in numerous advantages:**

✔ The roughness of the components is not rubbed off, instead they deform under load.
✔ The pressure absorption capacity of the surfaces increases significantly.
✔ In the micro area, flow smoothing occurs, resulting in a significant reduction in friction losses and wear.

Compared to conventional lubricants, it therefore enables a longer service life with lower lubricant consumption. Lower frictional heat ensures reduced energy consumption and makes a lasting contribution to reducing CO_2emissions and negative environmental impacts. The lower maintenance and repair costs also increase machine availability. This in turn results in cost savings in disposal, which leads to significant cost and resource savings.

The high-performance lubricants with TUNAP OMC_2 additive technology are already proving themselves in numerous applications and, thanks to stable operating conditions, help to extend bearing life and thus increase operating efficiency.

Three phases: This is how an OMC_2 lubricant acts on a surface.



Phase 1 – Formation of a lubricating film on the surfaces

Under pressure, the additive molecules of the OMC_2 technology initially attach themselves to the metal surface. A shear-stable and lubricating film is formed.

Phase 2 – Compaction of the surface wear layer

As the pressure increases, the metal surfaces deform and compact. The roughness is reduced and an effective protective layer is created. The risk of wear is already significantly reduced and the surfaces glide past each other more smoothly.

Phase 3 – OMC_2 effect development and surface smoothing

The OMC_2 components migrate further into the metal and cause the characteristic smoothing effect of the surface structure. This effect, also known as PD (Plastic Deformation) or SE (Surface Engineering), leads to a significant minimisation of friction and wear of the components.

TUNAP
Calcium sulphonate technology

The calcium sulphonate complex greases from TUNAP are already being used successfully in a wide variety of applications, especially where high loads, moisture or temperature fluctuations prevail.

Calcium sulphonate lubricating greases offer a convincing combination of physical stability, chemical resistance and outstanding loadbearing capacity. In contrast to conventional soap thickeners such as lithium complex or aluminium complex, calcium sulphonate complex soaps are able to withstand both mechanical and chemical loads thanks to their crystalline structure and a base reserve.

Advantages

✔ **Excellent corrosion protection**
In combination with their alkaline pH value and dense structure, they provide effective protection, especially in environments exposed to moisture and water.

✔ **Good water resistance**
The lubricating effect is maintained even in splash water or extremely damp environments.

✔ **Very good high-pressure and wear protection properties**
The soap structure acts as a physical buffer and reduces metallic contact.

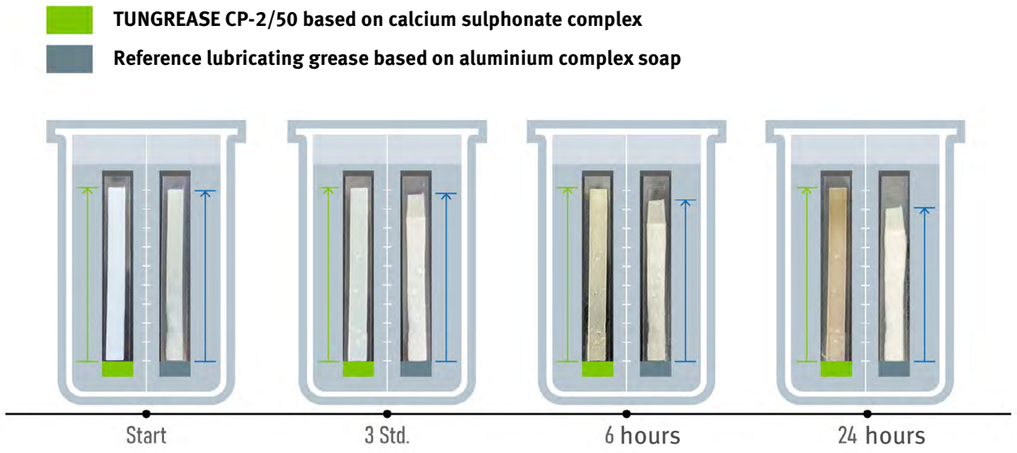
✔ **High mechanical stability:** They retain their consistency even under heavy mechanical loads, which extends the service life of the lubricated components.

✔ In addition, these greases can be **applied** very easily via **automated dosing systems**, an important point for modern production systems.

The use of greases based on calcium sulphonate complex soap thickeners reduces risks and complies with current environmental and health standards. This is particularly important in the lubrication of linear guides, especially in the food industry, where safety and hygiene standards are of paramount importance. They are considered more environmentally friendly than some traditional alternatives, are readily biodegradable and have a longer life, resulting in lower consumption and environmental impact.

TUNAP‘s calcium sulphonate complex greases are already being used successfully in a wide variety of applications, particularly where high loads, humidity or temperature fluctuations are prevalent.

TUNAP water resistance test
Based on DIN 51807-1



Results of 24-hour tests for water resistance based on DIN 51807-1

The water resistance tests show that with increasing time, the **aluminium complex soap-based reference lubricating grease** easily separates from the surface and emulsifies water in the lower part. This indicates a decrease in water resistance and can significantly impair the lubricating effect. **TUNGREASE CP-2/50 based on calcium sulphonate complex soap** shows no signs of dissolution over time and no loss of adhesion.

Targeted use of thickener technology

Linear guides place high demands on lubrication. To meet these challenges, TUNAP relies on a versatile portfolio of high-performance greases with specifically selected thickener technologies, from calcium sulphonate complex to aluminium complex soap and lithium complex. Each of these thickeners has specific advantages: be it excellent water resistance, thermal stability or high load-bearing capacity.

At the same time, tribological performance is crucial: oscillating movements, low sliding speeds and punctual load peaks require a lubricating film that provides lasting protection and reliable separation, even under start-stop conditions and with micromovements. The targeted combination of base oil, additive package and thickener ensures that friction is minimised, stick-slip is avoided and the service life of the guide is significantly extended.

The result: maximum process reliability and economical operation, even under demanding conditions.

Future-proof technology calcium sulphonate: greases for the highest requirements in the H1 area

TUNAP
Product highlights

TUNGREASE LMO-2/40

Universal high-performance lubricating grease with a focus on saving energy and extending relubrication intervals and component service life

- ✔ Low base oil viscosity ensures low shear resistance and therefore particularly smooth running
- ✔ High-performance additives based on OMC2technology ensure reliable surface protection even under high loads
- ✔ Extremely good oxidation resistance enables improvements in long-term and lifetime lubrication

TUNGREASE CK-2

Strong resistance to process media, combined with very good wear and corrosion protection for precise motion guides, for example in machine tools

- ✔ High pressure absorption capacity enables optimum wear protection and thus extends component service life
- ✔ Exceptional media resistance and high corrosion protection allow reliable lubrication even when exposed to water, cooling lubricants or weather conditions
- ✔ Versatile, high-performance lubricating grease enables a reduction in variety

TUNGREASE CP-2/50

Dynamically light, fully synthetic H1 high-performance grease with high wear and corrosion protection

- ✔ High pressure absorption capacity enables optimum wear protection and thus extends component service life
- ✔ Exceptional water resistance and high corrosion protection allow reliable lubrication even when exposed to water or in outdoor applications
- ✔ Versatile high-performance lubricating grease to support grade reduction in the food, beverage and pharmaceutical industries, also available in different base oil viscosities and consistency classes
- ✔ Oxidation and shear stable for a long grease service life

TUNGREASE BA

Chemically inert H1 special grease for lubrication at extremely high temperatures

- ✔ Extremely low evaporation rate offers the best possible lubrication at more than +300°C
- ✔ Particularly high thermal stability with extremely low evaporation loss enables extended relubrication intervals compared to conventional PFPE/PTFE high-temperature greases
- ✔ Good compatibility with common plastics and elastomers

TUNGREASE LP-1 LT

Fully synthetic special grease for particularly smooth running even at low temperatures

- ✔ Selected additives ensure reliable surface protection and very good corrosion protection
- ✔ Very good oxidation resistance enables improvements in long-term and lifetime lubrication
- ✔ Low base oil viscosity ensures low shear resistance and therefore particularly smooth running

TUNGEAR CGLP 220

Fully synthetic gear and bedway oil with adhesive additive

- ✔ Synthetic gear oil for universal use. Special adhesion additives give the product a multi-purpose character as gear, bed and slideway oil
- ✔ Reliable long-term lubrication of loaded gears and circulation systems
- ✔ Proven use in toggle lever lubrication to reduce stick-slip effects

TUNAP Product selection guide
Linear guides

More information

All-purpose grease	Influence of water	High loads	Moderate loads	High temperatures	Extremely high temperatures	Food registrations (NSF H1, Halal, Kosher)	Low speed High speed	High speed	Chemical resistance	Formulation without silicone	Product	NLGI	Lower service temperature in °C	Upper service temperature in °C	Further remarks	More information
		✔			✔	✔	✔		✔	✔	TUNGREASE BA	2	-20	350	Extreme chemical stability	SDS
		✔			✔	✔	✔		✔	✔	TUNGREASE 300	2	-40	250	Excellent material compatibility	SDS
	✔	✔		✔			✔			✔	TUNGREASE CM-2/460	2	-20	160	High wear and corrosion protection	SDS
	✔	✔		✔		✔	✔			✔	TUNGREASE CP-2/460	2	-40	160	Exceptional water resistance	SDS
✔	✔	✔		✔		✔	✔			✔	TUNGREASE CP-2/200	2	-40	160	Optimum wear protection	SDS
✔	✔	✔		✔		✔				✔	TUNGREASE CP-2/50	2	-40	140	Optimum wear protection	SDS
	✔	✔				✔		✔		✔	TUNGREASE CP-2/25	2	-50	120	High speeds and heavy loads	SDS
✔		✔				✔	✔			✔	TUNGREASE H1/EP-2	2	-30	130	Fully synthetic	SDS
✔			✔			✔				✔	TUNGREASE H1/EP-1 150	1	-40	130	Fully synthetic	SDS
✔			✔	✔				✔		✔	TUNGREASE LMO-2/40	2	-30	140	Particularly high smoothness	SDS
✔	✔	✔	✔				✔			✔	TUNGREASE CK-2	2	-20	140	High water resistance	SDS
✔			✔							✔	TUNGREASE EP-2	2	-30	120	Fully synthetic	SDS
✔			✔	✔				✔		✔	TUNGREASE LN-2/100	2	-40	160	Long-term lubrication	SDS
✔			✔	✔				✔		✔	TUNGREASE LP-1 LT	1	-30	130	Low temperatures	SDS
		✔					✔			✔	TUNGREASE LP-2/D6	2	-30	150	Damping	SDS
			✔	✔		✔	✔				TUNGEAR CGLP 220	-	-30	140	Fully synthetic	SDS

TUNAP
Container sizes

Consultancy, development and production from a single source

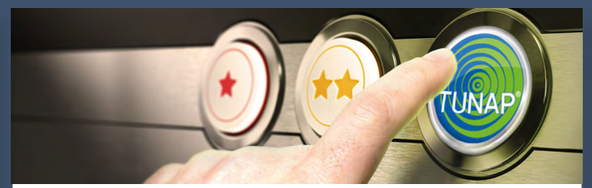
We supply you with optimised containers so that you can design your processes effectively and cost-efficiently. We offer customised solutions that a r e precisely tailored to your needs. Our range of containers offers flexibility and guarantees efficiency and economy, saving resources and the environment, as well as reducing your in-house stock levels.

Depending on the product line, various containers are ready for use as required:

✔ tube ✔ aerosole ✔ cartridges ✔ hobbock ✔ IBC
✔ cans ✔ bottles ✔ canister ✔ barrel

We work with you to develop and produce your own brand.

We are also happy to work with you to develop product solutions tailored to the needs of your target group. Whether highly specialised or cost-optimised lubricating greases, oils and pastes, cleaners or additives of the highest quality - we supply what you need. As a manufacturer with our own aerosol filling facility, we have extensive knowledge of a wide range of application methods and packaging forms. This allows you to benefit from the optimum combination of product and application for your particular application.



TUNAP wirkt.

We are at your disposal with help and advice to answer your questions and support you in selecting the right, products, container sizes and packaging forms. We look forward to working with you and offering you high-quality lubricants and optimised solutions that meet your requirements.

We cater to your individual needs:

Dispenser 100 g | Tubes from 20 ml to 300 ml | Cartridges 400 g / 500 g | Two-chamber cans / Bag on Valve | Bottles 30 ml up to 1000 ml | Single bags 3 g to 20 g

TUNAP
Common container sizes

TUNAP works.

TUNAP INDUSTRIE

For more than 50 years, the TUNAP Group has been an internationally operating manufacturer of aerosols and active ingredients for industrial and technical applications.

Research, development, production and sales from a single source: TUNAP systems maintain, protect and combine innovative chemistry with high sustainability standards.

We look forward to seeing you.

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With friendly recommendation

TUNAP.com

2000760 - TUNAP Industry High-performance lubricants for linear guides 2025 EN