

# smartGLEIT® LUBRICANTS

## Product Overview



[www.smartgleit.com](http://www.smartgleit.com)

 **smartGLEIT®**  
FRICTION MEETS ENGINEERING



# smartGLEIT®

## High-Class Lubrication



The team of smartGLEIT® has been successful in the specialty lubricants market for more than 20 years.

We develop, produce and sell specialty lubricants – the problem solvers even for particularly difficult cases.

smartGLEIT® stands for:

- customer- and service-oriented thinking and supportive throughout all cooperation all stages
- innovative premium lubricants of the highest performance
- environmentally friendly and sustainable products
- complete service package for the efficient solution of tribological problems
- extensive experience and comprehensive knowledge
- dependable manufacturing processes optimized for best quality
- reliable and flexible delivery logistics
- excellent value for money
- individual, customized solutions
- highest quality of products and services – ISO 9001:2015 certification

smartGLEIT® supplies specialty lubricants for numerous applications - we focus on these product segments:

- **greases and lubricating pastes with microwHITE solid lubricants**
- **solid film lubricants** (also called 'anti-friction coating' or 'AFC') - the dry alternative to oil- and grease-lubrication

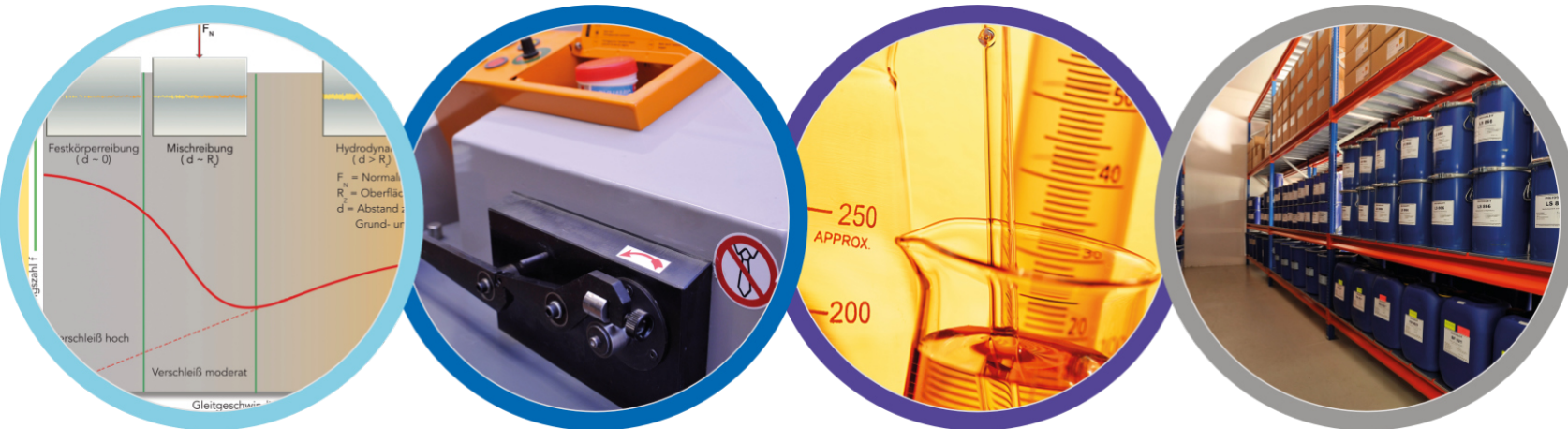
Our portfolio also includes a range of

- 'black' products with MoS<sub>2</sub>, graphite and other special solid lubricants
- top-class lubricants for threaded connections
- premium lubricating fluids (oils)
- inert special greases – media and temperature-resistant silicone-based lubricants
- special, high-quality "liquid tools" in spray cans (aerosols)



# Synergy

## From Tribological System to Perfect Solution



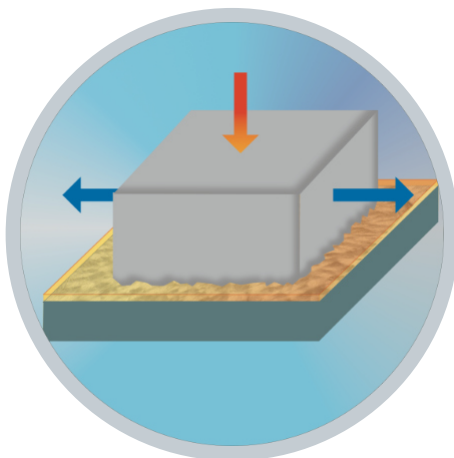
## Structural Elements of the Tribological System

Requirements are constantly increasing for the friction and wear behavior of tribological systems, and therefore lubricant.

The analysis and evaluation of a respective tribological system is a prerequisite for the selection of an optimal lubricant.

Tribological expertise, know-how of methods, best product technology and extensive experience are necessary to achieve the best results.

When you're looking for perfect lubrication, smartGLEIT® is the best solution.



### Friction Part 1

Substance  
Properties

Forming  
Characteristics

Interactions

Temperature  
Dynamics

### Friction Contact

Parameter  
Power Impact

Parameter  
Lubricating Gap

Type of Friction

Thermodynamics

Material Interaction

### Friction Part 2

Substance  
Properties

Forming  
Characteristics

Interactions

Temperature  
Dynamics

### Motion

Parameter 'Type'

Motion Sequence

- Linear
- Circulating
- $V=c$ ,  $V \neq c$
- Oscillating  $f$  (Hz)

Operation Time

Relative Velocity

### Lubricant

Formulation

Physical  
Parameter

Chemical  
Parameter

Temperature

Int. Dynamics

Application

### Environment

Temperature

Rel. Humidity %

Environment

- Media
- Corrosiveness
- Compatibility ..

Spec. Conditions

- Radiation, Vacuum,
- H1/H2,
- Process, ...









smartGLEIT®

LUBRICANT ↔ PRODUCT SEGMENT









PRODUCT SEGMENT		PRODUCTS				PAGE
	SOLID FILM LUBRICANT (AFC)	LS 808 LS 855 LS 888	LS 818 LS 866 LS 8012	LS 848 LS 877 LS 8042	TC 800 TC 88 NE	10 - 11
	microwHITE LUBRICATION PASTES	GP 360 PSV 710	LP 430 PSV 715	PSV 730		6 - 7 8 - 9
	microwHITE GREASE PASTES	GP 325 H FSV 760	GP 350 FSV 765	GP 355 FSV 786		6 - 7 8 - 9
	microwHITE GREASES	GSV 790	GSV 791			8 - 9

# Product Overview



smartGLEIT® offers a comprehensive portfolio of extremely powerful specialty lubricants and many customer-specific products.

For better orientation of this brochure, the product segments have specific color coding: dark grey for black products (such as MoS<sub>2</sub>, graphite or similar dark colored solid lubricants), green for dry lubricating films, yellow for greases and pastes with microwHITE solid lubricants, etc. ...

PRODUCT SEGMENT		PRODUCTS				PAGE
	BLACK PASTES AND GREASES	LP 410 LP 450 LP 461	LP 465 LP 475			12 - 13
	LUBRICATION FLUIDS	LF 110 S	LF 115	LF 155	LF 195	14 - 15
	PFPE PASTES	PP 620	PP 640			14 - 15
	SILICONE COMPOUND	SP 560				14 - 15
	DRY FILM LUBRICANT	DF 977 S	DF 979			14 - 15
	SELECTION GUIDE	Assignment: Application <--> Product "Which product is suited for my application?"				16 - 17

\* Products available as aerosols (spray cans) are marked with an „S“ after the product name.



# smartGLEIT® GP and LP Series

## microWHITE Lubrication Pastes and Greases



For lubrication tasks involving mixed friction – in particular oscillating movements ('vibration') – lubricants containing white solid lubricants are state-of-the-art.

White solid lubricants in combination with appropriate carrier media combine high load-carrying capacity and very good wear protection with clean application.

microWHITE solid lubricants' special formulation generates synergy effects: products based on this technology are market leaders.

smartGLEIT®'s microWHITE solid lubricants are the ideal platform to develop application-specific products. The variation of base oil, thickener and additive package allows the the lubricant's exact adaptation for a respective application.

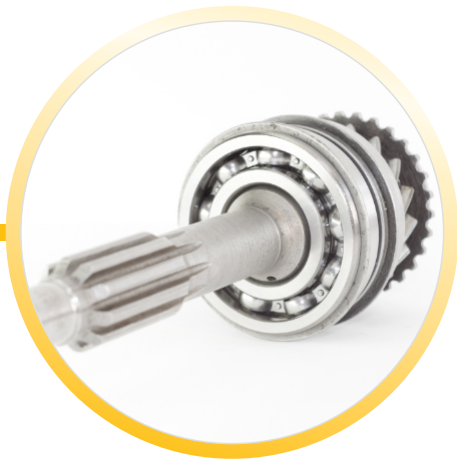
smartGLEIT® provides excellent white products for all applications such as

- assembly,
- running in and
- life-time lubrication.

smartGLEIT® microWHITE pastes and greases are ideal for all tribological applications with mixed or boundary friction:

- **innovative, microWHITE solid lubricants - light colored and therefore clean in application and use**
- very effective against fretting corrosion/vibrational wear
- reduces stick-slip
- very high load-carrying capacity, safe against adhesive wear (fretting)
- controlled friction values, steady course of friction
- as well as steel, also ideal for many other materials, e.g. stainless steel, bronze, brass, titanium
- microWHITE solid lubricants are also suitable for aluminum with typical coatings as anodizing, PVD, CVD, DLC and PCO
  - preliminary tests are recommended since layers can significantly impact lubrication results
- good corrosion protection and excellent water resistance

# The First Generation



## APPLICATION EXAMPLES:

Splined Shaft Connections + Joints + Blade-, Plate- and Coil-Springs + Spindles + Sliding guides + Gears + Bolts + Press fits + Precision mechanics + (slow-speed) Roller bearings, etc

## Some Operational Conditions for White Solid Lubricants:

High surface pressure + High temperatures + Corrosion protection + Oscillating movements (vibration) + Against fretting corrosion + As release agent during metal forming (cold & warm)

PRODUCT	DESCRIPTION	BASE	NLGI CLASS	OPERATION TEMPERATURE [°C]	TYPICAL FEATURES
GP 325 H	ultraWHITE Grease-Paste	paraffinum liquid., microWHITE SL	2	-25 to +110	The clean, smooth paste, e.g. for precision mechanics
GP 350	microWHITE Special Grease-Paste	mineral oil, Li-soap, microWHITE SL	2	-20 to +120	The all-rounder against fretting corrosion!
GP 355	microWHITE Semi-Synthetic Grease-Paste	mineral oil, Li-soap, microWHITE SL	2	-20 to +120	Very good adhesion, water- and coolant resistant; chuck paste
GP 360	microWHITE High Performance Paste	mineral oil, microWHITE SL	2	-25 to +110	The "fretting-corrosion-killer"!
LP 430	microWHITE High Performance Paste	mineral oil, microWHITE SL	2	-25 to +110 (200 °C as RA)	The universal paste against fretting corrosion; as Release Agent

# smartGLEIT® 700 Series

Highest Performance

Best Against Fretting Corrosion



**Anti-  
Fretting  
Corrosion**

smartGLEIT®'s new generation of label-free, microwHITE solid lubricants extends the previous performance limits for greases, pastes and grease pastes.

- The innovative smartGLEIT® 700 series is based on these new solid lubricants. A major step forward has been achieved against vibrational wear (fretting corrosion).
- Both in industrial testing and in demanding practical use, the 700 series products have shown unprecedented wear protection and load carrying capacity.
- smartGLEIT®'s 700 series products are universal problem solvers for many applications, such as
  - assembly,
  - running-in and
  - lifetime lubrication.
- 700 series products do not require labelling in accordance with GHS/CLP regulation EC No. 1272/2008.



smartGLEIT® 700 series microwHITE pastes and greases are setting new standards for all tribological applications with mixed friction, such as

- novel, microwHITE solid lubricants with significantly extended performance limits
- very fast build-up of a stable, tribochemical wear protection layer
- particularly high protection against vibration wear - the new performance standard
- extremely high load-carrying capacity
- reduces stick-slip
- controlled friction values, steady course of friction
- as well as steel, also ideal for many other materials, e.g. stainless steel, bronze, brass, titanium
- microwHITE solid lubricants are also suitable for aluminum with typical coatings as anodizing, PVD, CVD, DLC and PCO
  - preliminary tests are recommended since the layers can significantly impact the lubrication result
- good corrosion protection and excellent water resistance.



# The New Generation

## microWHITE Solid Lubricants



### APPLICATION EXAMPLES:

Splined Shaft Connections + Joints + Blade-, Plate- and Coil-Springs + Spindles + Sliding guides + Gears + Bolts + Press fits + Precision mechanics + Roller bearings, etc.

### Some Operational Conditions for White Solid Lubricants:

High surface pressure + High temperatures + Corrosion protection + Oscillating movements (vibration) + Against fretting corrosion + As release agent during metal forming (cold & warm)

PRODUCT	DESCRIPTION	BASE	NLGI CLASS	OPERATION-TEMPERATURE [°C]	TYPICAL FEATURES
PSV 710	microWHITE Special Paste	mineral oil, Lithium-soap, microWHITE SL	1 - 2	-20 to +100	Eliminates vibrational wear, very high load carrying capacity and excellent wear protection
PSV 715	microWHITE Special Paste with Synthetic Oil	PAO, Lithium complex soap, microWHITE SL	1 - 2	-40 to +130	Like PSV 710, but extended temperature range, plastic-friendly by PAO
PSV 730	microWHITE Special Paste for Elevated Temperatures	mineral oil, Ca-S-complex soap, microWHITE SL	1 - 2	-20 to +140	Like PSV 710, for elevated temperatures up to 140 °C
FSV 760	microWHITE Special Grease Paste	mineral oil, Li-soap, microWHITE SL	2	-20 to +100	Eliminates vibrational wear; Suitable as a grease paste also for slow running roller bearings
FSV 765	microWHITE Synthetic Special Grease Paste	PAO oil, Li-complex soap, microWHITE SL	2	-40 to +130	Like FSV 760, but extended temperature range, plastic-friendly by PAO
FSV 786	microWHITE Special Grease Paste for Elevated Temperatures	mineral oil, Ca-S-complex soap, microWHITE SL	2	-20 to +140	Like FSV 760, for elevated temperatures up to 140 °C
GSV 790	microWHITE Special Grease	mineral oil, Li-soap, microWHITE SL	2	-25 to +120	Multipurpose grease, especially for oscillating roller bearings or lubrication points with mixed friction component
GSV 791	microWHITE Synthetic Special Grease	PAO oil, Li-complex soap, microWHITE SL	2	-40 to +140	Like GSV 790 but extended temperature range, plastic-friendly by PAO

# smartGLEIT® Solid Film Lubricants

## The Dry Alternative



A tribologically functional coating in which powerful solid lubricants are incorporated in a resin matrix is called 'Solid Film Lubricant' (or 'Anti-Friction-Coating' (AFC) or 'bonded solid lubricant').

- smartGLEIT® solid film lubricants are supplied as a liquid dispersion, and can be applied to a component surface using standard paint application technologies.
- The contained solvent (H<sub>2</sub>O or organic) serves as a carrier liquid for resin and solid lubricants enabling film formation.
- The resin (or 'binder') also provides the best possible cohesive connection to the component surface.
- Solid Film Lubricants are surface systems that reduce friction and wear, and can complement or replace other wear protection systems.
- smartGLEIT® has comprehensive expertise and extensive experience in this product segment.
- Bonded coatings are universally applicable and suitable for numerous applications.

### Tribological Applications of Solid Film Lubricants

- Dry lubrication of metal or plastic components – preferably at low sliding speeds – at different stages of operation:
  - assembly
  - optimization of running-in
  - lifetime lubrication
  - in special operating conditions, e.g. operation in vacuum
  - oil or grease is best avoided to promote cleanliness
- Hybrid lubrication – solid film lubricant plus oil or grease. The combination of oil-resistant solid film lubricant and oil or grease lubrication significantly increases system performance – synergies can often be achieved.  
Such a hybrid system is particularly advantageous, indeed sometimes indispensable, for difficult running-in processes and highly loaded components in continuous operation.

# Universal Problem Solvers

Low Friction, Wear Protection, Cleanliness



## Application Examples:

Expansion + Upsetting + Hydroforming + Mandrels + Cores + Cold extrusion + Slide valves & ejectors (PDC) + HT lubrication + Screws + Dowel pins + Nuts + Titanium screws + Ti nuts + V2A / V4A connection elements + Connection elements in HT Range + Bolts + Rivets + Bearings + Skids + Cams + Wheels + Joints + Axles + Locks + Drills + Spindles + Tension levers + Plain bearings + Pistons + Actuators + Spindle drives + Guides + Disc springs + Gears + Chain pins + O-rings , .

PRODUCT	DESCRIPTION	BASE	CURING TEMP @ TIME	OPERATION- TEMPERATURE [°C]	TYPICAL FEATURES
LS 808	MoS <sub>2</sub> - Bonded Film Lubricant	H <sub>2</sub> O, PU, MoS <sub>2</sub>	20 °C - 60'	-70 to +250	Water based, ideal for assembly, running-in and cold forming
LS 818	Grafite - Bonded Film Lubricant	H <sub>2</sub> O, PU, graphite	20 °C - 60'	-70 to +250	Water based, ideal for cold and semi-hot forming
LS 848	PTFE - Bonded Film Lubricant	H <sub>2</sub> O, PU, PTFE	20 °C - 30'	-70 to +250	Water based AFC; also suitable for plastics, elastomers and wood
LS 855	MoS <sub>2</sub> - Bonded Film Lubricant	organic solvent, titanate, MoS <sub>2</sub>	20 °C - 60'	-180 to +450	Classic MoS <sub>2</sub> -Solid Film Coating, highest pressure resistance
LS 866	Grafite - Bonded Film Lubricant	organic solvent, titanate, graphite	20 °C - 60'	-180 to +550	HT-Coating - for assembly, running-in and cold/semi-hot forming
LS 877	PTFE - Bonded Film Lubricant	organic solvent, titanate, PTFE	20 °C - 30'	-180 to +250	Also suited for plastics and elastomers
LS 888	MoS <sub>2</sub> - Bonded Film Lubricant	organic solvent, PAI, MoS <sub>2</sub>	220 °C - 40'	-70 to +280	Media resistant AF-Coating; also for hybrid applications; SL-Level MH
LS 8012	MoS <sub>2</sub> - Bonded Film Lubricant	organic solvent, PAI, MoS <sub>2</sub>	220 °C - 40'	-70 to +280	Media resistant AF-Coating; also for hybrid applications; SL-Level M
LS 8042	High-Temperature - Coating	organic solvent, PAI, special HT-SL	220 °C - 40'	-70 to +1200	Special coating with HT-release properties; metallurgical compatibility
TC 800	Thinner	organic solvent	--	--	For LS 855 - LS 866 - LS 877
TC 88-NE	Thinner	organic Solvent	--	--	For LS 888 - LS 8012 - LS 8042

# smartGLEIT® Black Products

## The Classic Solid Lubrication



Molybdenum disulphide, graphite and other special 'black' solid lubricants are used in many applications such as powders, pastes, greases and suspensions for special tribological challenges. High surface pressures or extremely high or low temperatures are typical applications. These materials' special lattice structure enables slip planes to be created with sometimes very low coefficients of friction on component surfaces. These solid lubricants' strengths are especially clear at very low sliding speeds in combination with high surface pressures. Since these solid lubricants work well in the absence of oils, they are found in many high temperature applications - e.g. for hot forming (forging)..

- smartGLEIT® black solid lubricants typically comprise synergistic mixtures of e.g. MoS<sub>2</sub> and graphite and other solid lubricants. In conjunction with high-quality carrier media such as oils, metal soaps, binder resins, etc., lubricants meeting highest performance expectations typical for smartGLEIT are produced

### Application of Black Products

Black products can be used in different stages of operation:

- assembly
- running-in optimization
- lifetime lubrication
- under special operating conditions, e.g. high temperatures
- as a release agent and lubricant during hot forming

The metallurgically-compatible formulation of solid lubricants for very high temperatures deserves particular attention - this prevents fatal effects on component material, such as pitting, solder brittleness, cracking, changes in microstructure, etc.

- smartGLEIT® products with special formulation are especially safe.

### Typical Applications of MoS<sub>2</sub> , Graphite and Similar.:

- dry or powder lubrication of metal or plastic – preferably at low sliding speeds and/or high pressures
- heavy duty lubrication of components made of metal (or plastics) – the solid lubricants are typically used in dispersions, pastes or greases, each adapted to a particular application



# MoS<sub>2</sub>, Graphite and Co

## For Extreme Loads and/or High Temperature



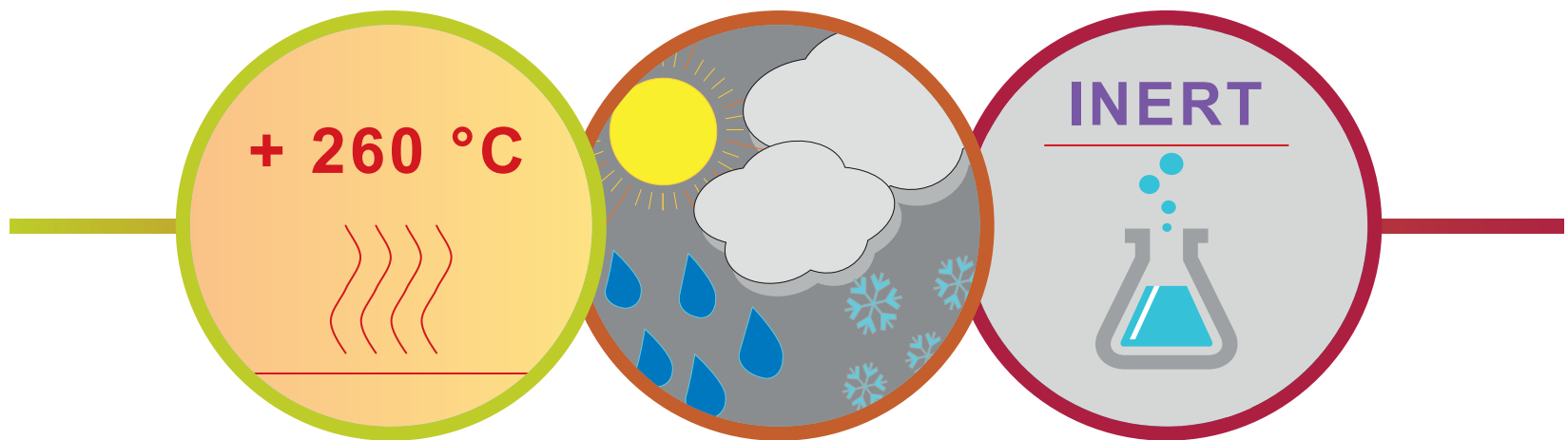
### Application Examples:

Assembly and running-in + Mounting / inserting of press- and transition fittings + High-temperature lubrication + Release agents + Roller and journal bearings + Skids and guide tracks + Threaded spindles + Joints + Bolts and nuts + HV-fittings + Stainless steel screws + Screws for steel construction + Hot-dip galvanized screws / nuts + Screws with Zn-flake layers + High temperature screws + Casting ladle facing + Spouts + Lubrication of ejectors + etc.

PRODUCT	DESCRIPTION	BASE	NLGI CLASS	OPERATION-TEMPERATURE [°C]	TYPICAL FEATURES
LP 410	The Classic MoS <sub>2</sub> - Paste	mineral oil, SL with MoS <sub>2</sub>	2	-25 to +450	Assembly- and run-in paste; solves problems with mixed friction
LP 450	Synthetic MoS <sub>2</sub> - Paste	synthetic oil, SL with MoS <sub>2</sub>	2	-25 to +450	High temperature lubrication with mixed friction
LP 461	Graphite Casting Ladle Facing	synthetic oil, graphite	1 - 2	- 15 to +1200	Casting ladle facing (e.g. for PDC); high-temp. lubrication (Ejectors)
LP 465	High Temperature Paste	synthetic oil, special SL	2	-25 to +1100	High temperature lubrication with mixed friction; screw paste
LP 475	The Hot Screw Paste!	bio-synthetic oil, special SL	2	-40 to +1200	Eco-friendly, metallurgically compatible screw paste

# smartGLEIT® Special Products

The Best of Their Kind



In addition to products from the core portfolio, smartGLEIT® also offers other specialties, each of which is a market leader. smartGLEIT® also offers customized products - tailor made to meet the needs of an application or customer.

Off-the-shelf specialties always meet smartGLEIT®'s premium standards and are characterized by exceptional performance.

**smartGLEIT® LF series lubricating fluids** solve problems with friction and wear in production, maintenance and servicing.

- LF 110 and LF 115 fluids are based on synthetic, biodegradable base oil. A special additive package enables excellent lubricity and very good corrosion protection. Its spreading effect enables the fluid to penetrate deep into the lubrication points and it is also very effective at loosening rusted connections.
  - LF 110's alcohol content further increases the spreading effect and strong cleaning power.
- LF 195 High-Cut drilling and cutting oil has an environmentally-friendly formulation and excellent application performance.

- smartGLEIT® LF 155 and Hot Chili fluids are excellent lubricants for industrial- and motorcycle chains. Includes peak properties important for chain drives, such as adhesion, corrosion protection, lubricity, compatibility and applicability.
- Silicones' good properties make them an important part of tribology. The smartGLEIT® SP 560 silicone compound is based on high quality silicone oil in an inorganic thickener. The product is suitable for a variety of applications where
  - temperature resistance
  - physiological safety
  - good lubricating performance, especially for material pairings with plastics or elastomers
  - and water resistance are important parameters
- Perfluorinated polyether oils (PFPE-Oils) have exceptional properties and are used as tribological problem-solvers when other oil types fall short.

**smartGLEIT® PP series** products use these properties - **PP 620** and **PP 640** are excellent greases with high lubricity, chemical resistance (also O<sub>2</sub>), temperature resistance, material compatibility, physiological safety, incombustibility, etc.

# Our Tribo-Tools

## Higher Performance for Operation and Maintenance!



### Application Examples:

Thin film lubrication of machine parts (chains, springs, locks, hinges, precision mechanics) + Moisture suppression + Preservation + To loosen (rusted) connections + Machining, cutting, milling + Chains + Wire ropes + Sliding guides + O-rings, seals + Plastic / elastomer / metal lubrication + Release agents + Food and medical technology + Lubricants for cables + Fittings + Roller bearings + Electrical appliances + Packings + Ball valves + Rolling bearings + Valves + Actuators + NVH applications + etc

PRODUCT	DESCRIPTION	BASE	NLGI CLASS	OPERATION-TEMPERATURE [°C]	TYPICAL FEATURES
LF 110	Bio-Rust-Loosener "4 in 1"	bio-degradable synthetic oil	Spray	-20 to +80	Rust loosener, cleaner, lubricating oil, corrosion protection in one product; great also for bicycle chains!
LF 115	Bio-Lubrication Fluid	bio-degradable synthetic oil	25" @ 3mm	-20 to +100	Premium lubrication fluid corrosion protection and rust loosener
LF 155	White, Adhesive Chain Lubricant	semi-synthetic oil, microWHITE SL	26" @ 3mm	-15 to +125	Adhesive fluid for lubrication of chains and wire ropes
LF 195	Drilling and Cutting Fluid "High-Cut"	bio-synthetic oil, microWHITE SL	~500 mm <sup>2</sup> /s	--	Solves even difficult cutting tasks
DF 977 (S)	"The Clean Universal Lubricant", "μ = 0,1"	synthetic special wax in org. solvent	--	0.09 – 0.11	Dry and clean lubrication, multi purpose use
DF 979	Corrosion Protection Film	wax	--	--	Transparent, touch dry corrosion protection film with lubricity
SP 560	Special Silicone-Compound	silicone oil, inorganic thickener	2	-40 to +200	Universal Si-grease, compatible with plastics, elastomers & the environment
PP 620	Inert, Superfine High Temperature Grease	PFPE-oil, microWHITE SL	2	-25 to +260	The maximum - when nothing else works; chemically resistant, for high temperatures; high load carrying capacity
PP 640	Inert, Superfine High Temperature Grease	PFPE -oil, microWHITE SL	2	- 25 to +260	

# Selection Guide

Application ↔ Typical Products\*

Machine Elements

GSV 791  
GSV 790  
LP 410  
LP 450  
PP 620

FSV 765  
PSV 730  
PSV 715

GSV 79x  
FSV 76x  
PSV 71x  
PP 620  
LP 410

GP 350  
GP 325  
LS 888

GSV 791  
GSV 790  
FSV 765  
GP 350  
LP 410

LS 888  
PP 620  
PSV 715

GSV 791  
GSV 790  
GP 303  
FSV 765  
PP 620

PSV 71x  
LS 8xx  
LP 410  
GP 350  
GP 360

PSV 710  
PSV 715  
PSV 730  
GP 360  
GP 430

GP 325  
FSV 76x  
FSV 780  
LS 888

FSV 765  
GP 355  
LP 410  
LP 450  
LP 465

LS 855  
LS 888  
LF 155  
PP 620

LF 155  
LF 115  
LF 110 S  
LS 888

PSV 710  
PSV 715  
PSV 730  
GP 360  
GP 430

LS 888  
LS 855  
LP 410  
LP 465  
PP 620

LS 877  
LS 848  
DF 977  
SP 560  
PP 620

PP 640

PSV 710  
PSV 715  
PSV 730  
FSV 765  
FSV 786

GP 360  
GP 325H  
GSV 790  
GSV 791

LP 475  
PSV 710  
PSV 730  
GP 430

LS 808  
LS 855  
PP 620  
LP 410

GSV 790  
GSV 791  
LG 210  
LS 855  
LS 888

FSV 765  
FSV 786  
PP 620

GP 325H  
SP 560  
PP 620

FSV 765  
GSV 791

LS 8xx

FSV 786  
FSV 765  
GP 355  
GP 350  
PP 620

PP 640  
LS 888

GSV 790  
GSV 791  
FSV 765  
FSV 786  
LS 888

PP 620  
LP 410  
LS 855

LP 461  
LP 461-00  
LS 855

DF 977

LS 818  
LP 461

LS 808  
LS 818  
LS 866

Machine Elements

Process

\* We have listed products that are either generally or particularly well suited for each application, or those for special (operating) conditions.



# smartGLEIT® Premium Lubricants

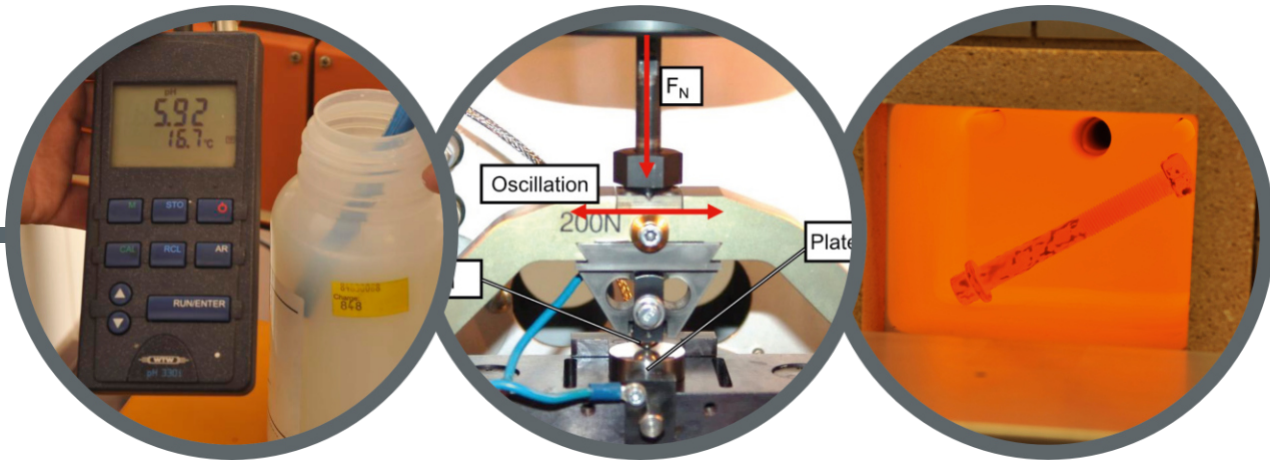
## Product Selection for Given Applications

Service Conditions/Intended Use	 FRETTING CORROSION	<div>PSV 710</div> <div>GP 360</div> <div>PSV 715</div> <div>LP 430</div> <div>PSV 730</div> <div>GP 350</div> <div>FSV 76x</div> <div>LS 888</div> <div>FSV 78x</div>	 PRESS-FIT	<div>PSV 710</div> <div>DF 977</div> <div>LP 410</div> <div>LS 855</div> <div>GP 360</div> <div>LP 430</div>	 ARMATURES	<div>PP 620</div>
	 PLASTICS/ELASTOMER	<div>PP 620</div> <div>LS 848</div> <div>PP 640</div> <div>DF 977</div> <div>LS 877</div> <div>SP 560</div>	 PRECISION MECHANICS	<div>GP 325H</div> <div>PP 620</div> <div>LF 110 S</div> <div>LS 877</div> <div>DF 977 S</div>	 HOUSEHOLD - DIY	<div>DF 977 S</div> <div>LF 110</div> <div>LS 877</div> <div>SP 560</div>
	 MAINTENANCE	<div>LF 110</div> <div>DF 979</div> <div>LF 155</div> <div>DF 977 S</div> <div>LP 410</div> <div>LP 475</div> <div>LP 855</div>	 RUST LOOSENER	<div>LF 110 S</div>	 CORR. PROTECTION	<div>LF 110 S</div> <div>DF 979</div> <div>LF 155</div>
	 MEDIA RESISTANT	<div>PP 620</div> <div>PP 640</div> <div>LS 888</div> <div>LS 8012</div>	 HIGH TEMP. < 450 °C	<div>PP 620</div> <div>LP 465</div> <div>LS 888</div> <div>LP 475</div> <div>LS 8012</div> <div>LS 855</div> <div>LP 410</div> <div>LP 450</div>	 HIGH TEMPERATURE < 1200 °C	<div>LP 475</div> <div>LP 465</div> <div>LS 8042</div> <div>LP 461</div>
Connection Elements	 WOOD CONSTRUCTION	<div>DF 977</div>	 1.4xxx - A2 - A4	<div>DF 977</div> <div>LP 475</div> <div>LP 465</div> <div>LP 410</div> <div>LS 855</div> <div>LS 888</div>	 Zn - ZnFe - ZnNi	<div>DF 977</div>
	 PHOSPHATING	<div>DF 977</div>	 ALUMINIUM	<div>DF 977</div>	 CUTTING/FORMING	<div>DF 977</div>
	 < 1200 °C	<div>LS 8042</div> <div>LP 475</div>				

Colors reflect the product segment.

The selection must be verified, based on individual tribological conditions.

## Measuring and Testing



The development, production and application of lubricants requires a comprehensive tribological test chain, comprising chemical-physical and mechanical-dynamic test methods.

Depending on the application, there are numerous testing equipment and measuring devices to evaluate lubricant properties and its effects:

- **Chemical-physical tests** for the characterization of raw materials and products, such as viscosity, penetration, pH-value, particle size, dry residue, film adhesion, oil bleed, layer thickness, oxidation stability, corrosion protection, appearance, etc.
- **Mechanical-dynamic tests** to determine the friction and wear behavior of lubricants. In order to map the complex, tribological practice, many test methods of various reality or simulation models are available. Simulation models can be divided into six categories - please see info box on top right of opposite page.
- Due to time and cost, categories 1 to 3 tests are avoided whenever possible. However, these tests are often especially necessary for complex systems or larger series applications.
- For the development/approval of lubricants for specific applications of medium or low complexity (e.g. chain drives, Bowden cables, spindles, screws), category 4 and 5 tests are successfully applied.
- The model test (Cat. 6) has great advantages in terms of testing-costs and -times and is therefore often used for development and quality assurance. Correlation to an application can only be evaluated by an experienced specialist and, if necessary, supplemented by higher categories trials.
- There are both standardized and non-standardized tests. Standardized test methods include
  - the SRV-test in accordance with DIN 51834 (vibration friction wear device')
  - the four-ball apparatus (VKA) in accordance with DIN 51350
  - the Brugger test instrument in accordance with DIN 51347
  - and a test method to evaluate corrosion protective properties of a grease according to DIN 51802 (EMCOR method)
- Typical non-standardized testing machines include e.g. the Reichert wear scale, the Almen-Wieland testing machine and the Press-Fit Test.

# Science

## Evaluation and Implementation



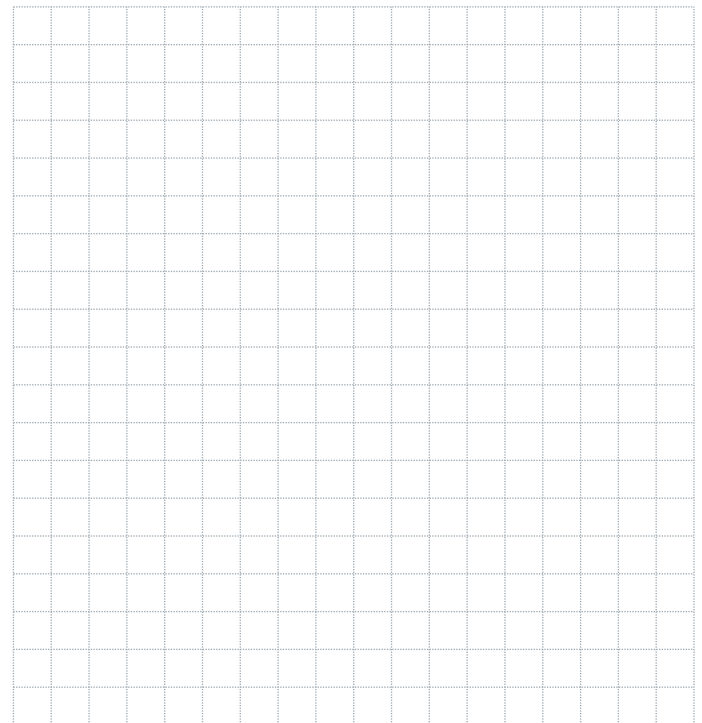
### Mechanical-Dynamic Test Methods

#### Categories:

- Cat. 1: Operational Tests
- Cat. 2: Test Bench - Machine
- Cat. 3: Test Bench - Module; Aggregate
- Cat. 4: Test Bench - Component
- Cat. 5: Laboratory test - Specimen, Load Equal or Similar to Actual Application
- Cat. 6: Model Test - Standardized Test Specimens and Parameters

- The availability of test equipment and test benches alone does not automatically lead to the goal.
- Success, i.e. the required functioning of the tribological system (ultimately application), is extensive expertise on
  - tribology
  - methods (measurement, analysis, implementation, control)
  - processes and
  - linking of all details
- The smartGLEIT® team offers professional advice and practical support throughout the product cycle:
  - product selection and specification,
  - product validation, and
  - practical implementation/application
- **smartGLEIT® - With Synergy for Your Success!**

### NOTES





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LEGEND/ABBREVIATIONS:

Ca-S = calcium sulfonate; SL = solid lubricants; HT = high temperature; IGL = integrated lubricant; M = medium; MH = medium high;  
MoS<sub>2</sub> = molybdenum disulfide; PAI = polyamide-imide; PAO = polyalphaolefin; PE = polyethylene; PTFE = polytetrafluoroethylene;  
PU = polyurethane; Si<sub>x</sub>O<sub>y</sub> = silicate; Ti<sub>x</sub>O<sub>y</sub> = titanate.

The information given and recommendations made herein reflects our current knowledge, of which this brochure can only give a brief overview. Given values are not suitable for the creation specifications. We reserve the right to make changes based on technical developments or legislative changes. Due to the wide range of possible applications and operating conditions, the product information is necessarily only of an indicative nature. Therefore, no binding liability or warranty claims can be based on these contents. In all cases, we strongly performing tests prior to use in order to determine whether the product meets all requirements and expectations

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