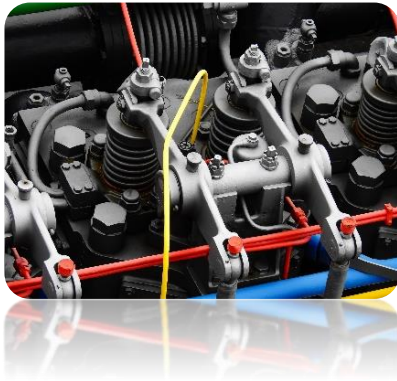


METALON

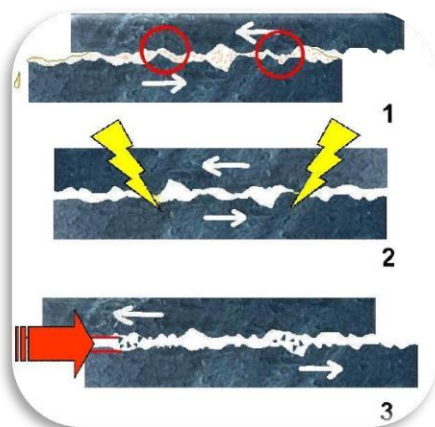
... more than greasing



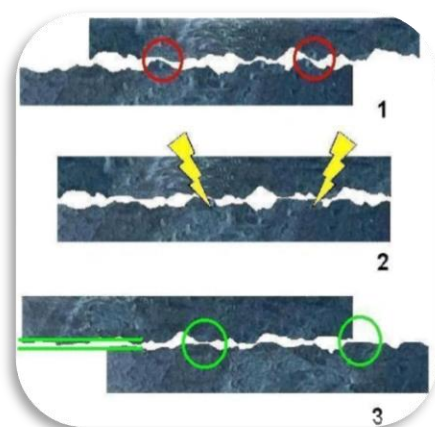
METALON ®

- Stops wear almost completely
- Protects metal surfaces from abrasion
- Reduces friction, heat generation and contamination
- Provides for smoother metall surface

before using METALON ®



After using METALON ®



METALON ® SWISS is available at:

METALON ® Swiss, BOHA AG, Baselstrasse 6A, 4243 Dittingen, Switzerland
www.metalon.ch / info@metalon.ch / 0041 (0)61 761 16 16

METALON

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We are at your disposal for questions



Thomas Boillat



Matthias Hänggi

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About METALON ®

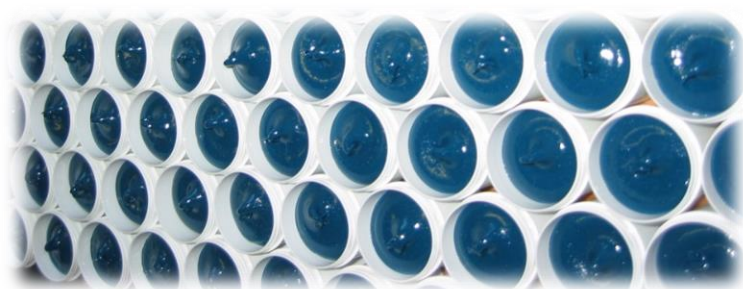
- METALON ® is our product name with **registered trademark** protection in Switzerland and the 28 states of the European Union.
- METALON ® Products are **high-tech high-performance lubricants** and specially developed to prevent wear on all metallic surfaces under the toughest conditions.

METALON ® Extreme Pressure Oils

- **Areas of application:** Engines, transmissions, differentials, metalworking, tool manufacturing, hydraulic systems, compressors, refrigeration systems, precision engineering, tractor pulling, racing and many more.
- **METALON ® has an effect directly on metal surfaces** (English on the metal: ON METAL, METAL-ON). It works best as an additive to an existing lubricating oil.
- We recommend to add 10% METALON ® of the existing lubricating oil - depending on the type and level of mechanical load and the expected effect. Further information can be found in the product data sheets.
- METALON ® high performance lubricants are **hydrocarbon complexes** – you can find the advantages on page 6.

METALON ® Extreme Pressure Grease

- **Areas of application:** All types of bearings, sliding surfaces, spindles, toothed power transmissions and many more. METALON ® is an excellent electrolyte and improves the conductivity of contacts and prevents corrosion.
- METALON ® Greases are **calcium sulfonate complex** greases – you can find their advantages on page 8.



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Reasons to use METALON ®

Dry running properties

Metal surfaces treated with METALON ® have excellent dry running properties. Even if the lubrication fails (due to line clogging, maintenance errors, etc.) the unit will not suffer any damage for a short time. Nevertheless, we recommend regular dosing or lubrication with METALON ® to avoid further damage later on.

New Machines

The use of METALON ® is recommended as early as possible. METALON ® is absolutely free of solids and does therefore not change the given tolerances. The extension of original tolerances due to wear are kept to a minimum from the start. The precision of the new equipment is optimally protected.

Time is Money

METALON ® can help you to reduce the downtime of your machines and to make the operating facilities more efficient and safer. According to estimates of the German Federal Ministry of Education and Research, the German economy loses 10 billion Euros annually through friction losses and wear.

METALON ® increases the tolerances

According to a German study, two thirds of all machine failures are due to incorrectly used lubricants or untimely maintenance.

Use METALON ® – it's worth it

The purchasing costs for METALON ® products are not cheap, but from a value analysis point of view they are 10 to 100 times cheaper than the costs of machine damage and loss of production – and they help you to maintain a good image with customers.

We are here to help you

We are happy to advise you and to provide you with further information.

www.metalon.ch / info@metalon.ch / 0041 (0)61 761 16 16

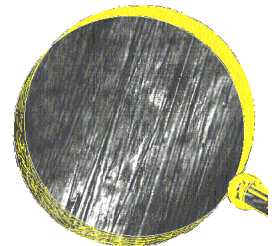
METALON

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Applications of METALON ®

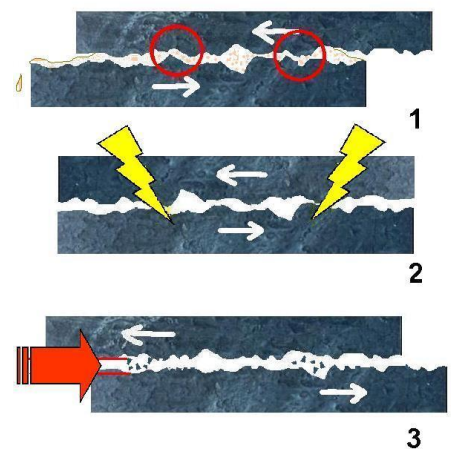
The metal surface

When looking at a cleanly machined metal surface (in the magnification), one notices that this "surface" resembles a lunar landscape. Mechanical processing produces grooves and ridges that can still be seen even at the finest processing.



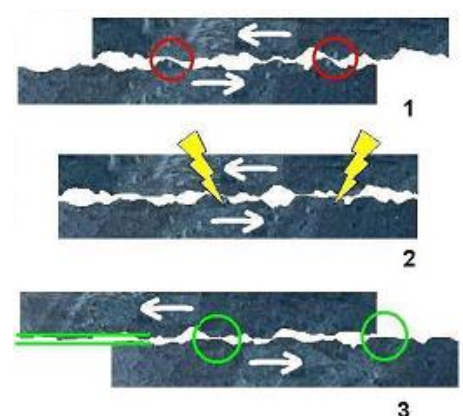
Cold Welding

- 1) Two metal surfaces touching each other and set in motion threaten to "strike" with their elevations
- 2) A "flash temperature" of $> 1400\text{ }^{\circ}\text{C}$ is created by touching the metal tips. The two tips are welded.
- 3) As the two metal surfaces continue to shift against each other, the welded areas break up. The surface has been damaged, the particles of the breakout float between the metal surfaces in the oil or grease and cause further damage. Larger particles are caught by particle filters. Smallest particles remain. The tolerance is constantly increasing.



METALON ® stops cold welding

- 1) As mentioned above
- 2) Again, maximum temperature is created by the collision of two elevations - the two elevation points threaten to weld.
- 3) This is when METALON ® molecule acts: **By chemical-physical connection it protects the two elevations. Instead of welding, smoothing occurs and the tolerance is maintained.**



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METALON ® smooths continuously

Depending on the degree of coating, metal surfaces have a supporting layer of about 30% of the total surface.

Considering the progressive development while using METALON ®, you can see the treated surfaces are not only protected, but **continuously smoothed more and more.**



~30%



~50%



$\approx \frac{F}{3}$

>80%

METALON ® reduces the surface load

Up to about 80 % of the total area is now covered by the applied forces, which corresponds to about one third of the original surface load (per square millimetre)

METALON ® reduces friction, heating and contamination

Smoother surfaces, less surface load and less break-out particles reduce friction and thus the heating of the components of an aggregate. The smooth metal surface is much less contaminated.

METALON ® protects against further wear and tear

METALON ® prevents further welding at each individual contact point during operation and thus reliably stops the increasing damage to the metal surface.

METALON ® for new installations

For the reasons mentioned above, we recommend the use of METALON ® in all new installations from the beginning - to protect their surfaces and tolerances from the beginning and to prevent damage.

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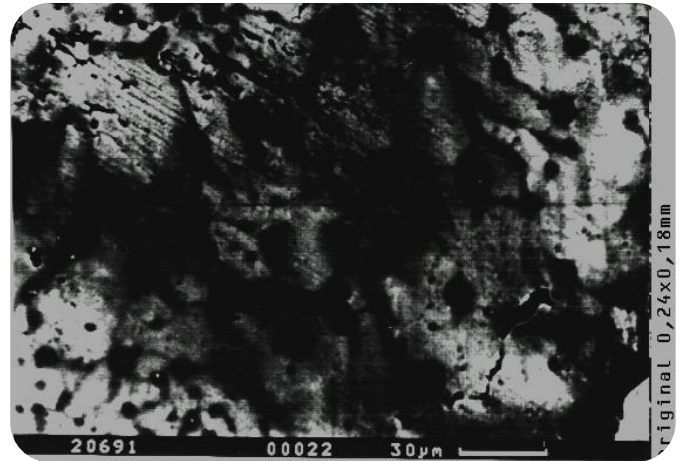
How METALON ® works in practice

Before using METALON ®



Break-out points by cold welding (standard lubrication), magnification 600 times

After using METALON ®



Smoothing of the damaged metal surface after using METALON ®, magnification 600 times

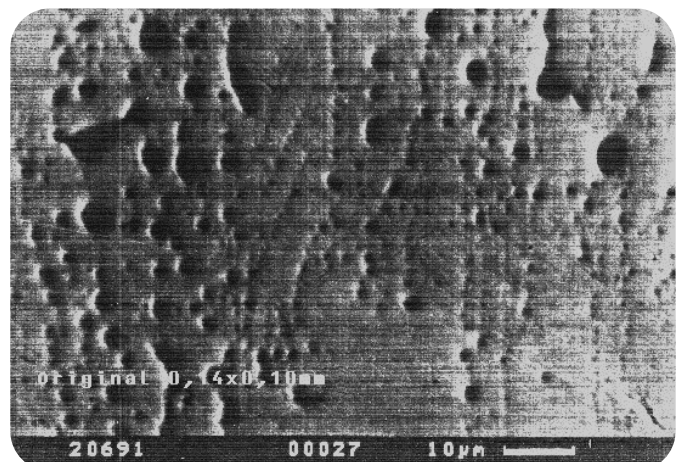
The dark areas in the pictures are depressions with oil drops. The metal surface is thus further protected from cold welding.

Before using METALON ®



Relatively rough original surface of a rolling bearing, magnification 200 times

After using METALON ®



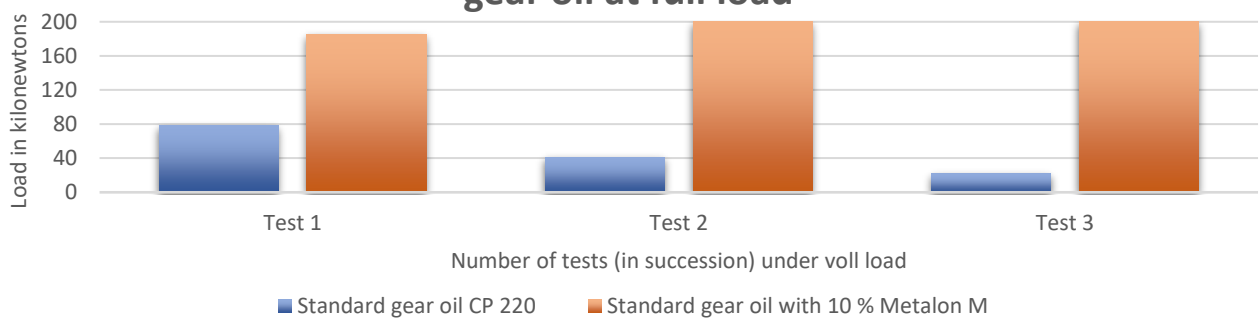
Rolling bearing surface smoothed and protected through the application of METALON ® magnification 1200 times

METALON

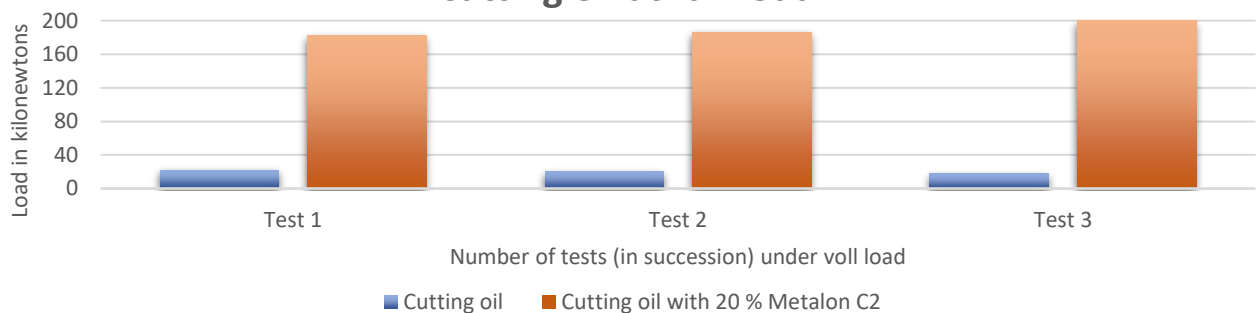
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The advantages of METALON® Hydrocarbon complex lubricant

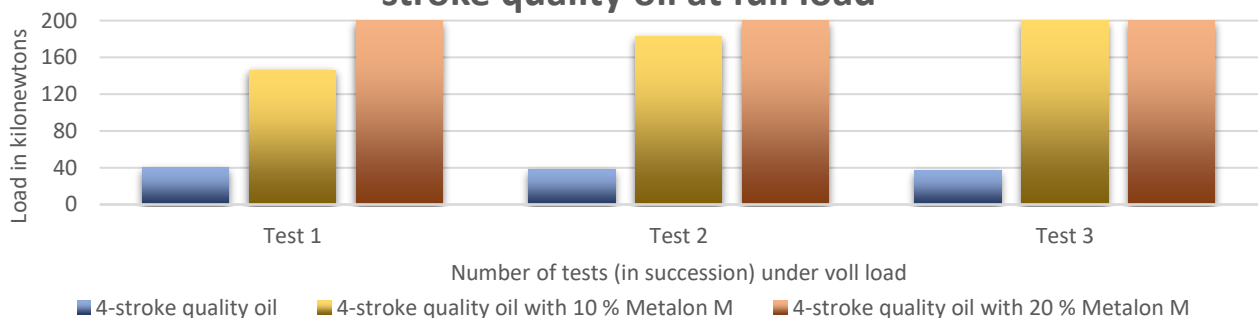
Change in lubrication performance during tests with a gear oil at full load



Change in lubrication performance during tests with a cutting oil at full load



Change in lubrication performance during tests with a 4-stroke quality oil at full load



METALON

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Main component of METALON ® oils

METALON ® oils are based on a **hydrocarbon complex**.

Protection of the metal surface

Protection of the metal surface and wear **reduces friction, wear and heat generation**. The results are not only the maintenance of tolerances and smooth running, but also energy savings and stabilization of normal temperature.

METALON ® works differently than additives

Unlike all additives known today, METALON ® bonds chemically and physically with the molecules of the metal component at the moment of impending cold welding. A microscopic, monomolecular shield against wear of the metal surfaces is continuously built up and prevents further damage to treated areas.

Miscible with all common industrial oils

Mixed with mineral, semi-synthetic and synthetic oils, the exclusive formula of METALON ® helps to minimize maintenance and repair costs and increases the performance. In combination with cutting oils, METALON ® oils maintain the sharpness of cutting tools. This allows lower cutting performance, higher cutting speed and smoother results in the machined areas.

Test results (see above)

The tests show **that the wear protection is significantly increased by adding METALON ®** - already at the first application. The surface damage (see grinding marks) is significantly higher without METALON ®.

Cold start properties

One of the unique properties of METALON ® oils is their chemical-physical bonding to the protective metal surface. METALON ® does not drip when the unit stands still and therefore also protects the machine during cold starts.

dry-running properties

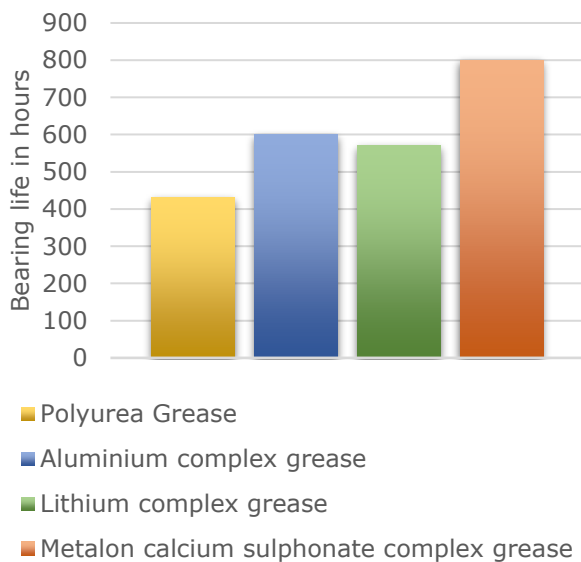
Even after draining the engine oil (with METALON ® - additive), the running surfaces on cylinder, piston rings and crankshaft have not been damaged after further operation. The explanation for this unique effect is the following: The already hardened areas continue to bear the load. However, there is no further smoothing and no additional protection, which is why such tests are not recommended in practice.

METALON

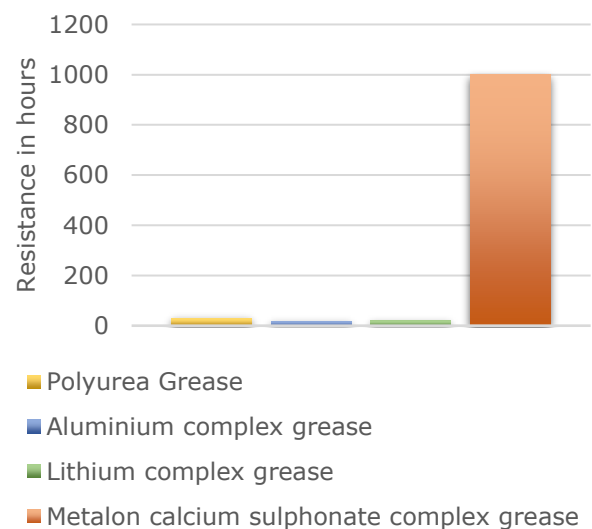
... more than greasing

The advantages of METALON® calcium-sulfonate complex grease

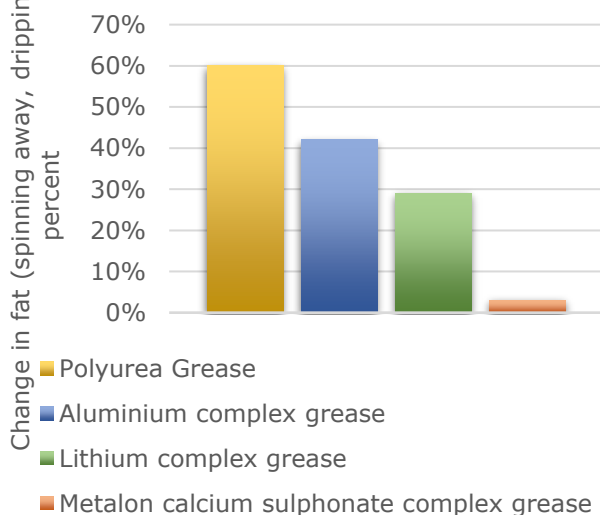
High temperature stability: life at 10 000 rpm at 149 °C (test D3336)



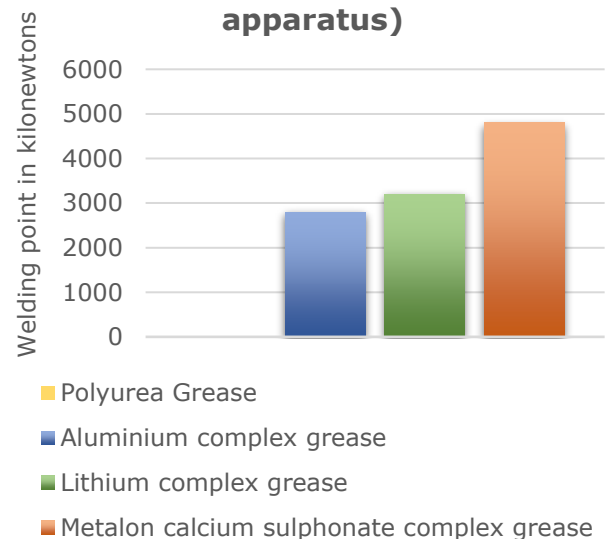
Rust and corrosion resistance: resistance in hours with a salt spray of 0.0381 mm



Mechanical stability: change in grease when subjected to 100 000 strokes (test ASTM D-217)



High pressure and wear resistance properties: Welding point in Newton (test ASTM D2596 on the 4-ball apparatus)



METALON

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Main component of METALON ® greases

METALON ® greases are based on a **calcium sulfonate complex**. This multi-purpose product surpasses considerably other first-class products such as lithium complexes, aluminium complexes or the polyurea thickened greases which are often complicated to use.

High temperature stability

- **Considerably longer service life** of shaft bearings at high operating temperature (149 °C)
- Drop point is above 300 °C

Excellent mechanical stability

- **Excellent stability** is achieved even under the highest mechanical stress
- The grease does not drip – it stays where it should be

Water Resistance

- METALON ® greases resist washout

Rust and corrosion resistance

- In a salt water environment, METALON ® grease is far superior to the others. The protection of the technical equipment works **without the addition of possibly disturbing rust inhibitors**.

High pressure and wear resistance properties

- Higher welding point than other greases
- Much higher limiting loads

Wear protection

- METALON ® greases surpass all other greases in the wear test

Resistance to Oxidation

- Low pressure loss, does not harden under load

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METALON ® HT Extreme Pressure Grease

- stops wear almost completely
- protects metal surfaces from abrasion
- provides for smoother metal surfaces
- reduces friction and heat development
- possesses high electrical conductivity



Application and impact

METALON HT (high temperature) greases protect against rust, corrosion, oxidation, water washout and provide excellent mechanical and thermal stability. The application range is between **-40 ° C and +300 ° C**. METALON greases are based on a calcium sulfonate complex and were originally developed for the submarines of the Canadian Navy (saltwater environment). METALON greases provide residual anti-wear protection during threatening cold welding (>1400°C) between two microscopically small metal surfaces and instead of damage of its two involved micro surfaces METALON greases protect against abrasion even when the grease is squeezed out. METALON greases are typically used in industry, engineering, automotive, marine equipment, gears, bearings, stuffing boxes, oven conveyors, military equipment, tractor fifth wheels, farm production and so on.



Consistency

METALON HT greases reach several NLGI grades and enable **universal use** (METALON HT 1.5 is suitable for NLGI grades 1 and 2). More information see backside.



How to use

It is highly recommended to use the HT-EP greases purely. Mixture with other greases can lead to failed lubrication. For mixed types of greases, we reject each responsibility. Lubrication lines of central lubrication systems are to be through-smear up to the blue grease squeezes out on the lubricating point.



Packages (Number per box)

10 ml syringe (60), 50 ml syringe (30), 50 g mini-box (30), 330 g box (10), 400 g cartridge DIN 1284 (10), 1 kg box (6), 5 kg pail (1), 20 kg pail (1), Other packages on request.



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METALON ® HT Extreme Pressure Grease

material safety data sheet (msds)

All safety data sheets can be found online on www.metalon.ch – we will also send you one along with your order.

REACH registration

The REACH Registration is NOT necessary for any of the METALON ® products. Delivery security within European Community is ensured.

Languages

The safety data and technical data sheets are available in German, French and English.

ASTM Specifications

Description	ASTM	results
Colour, Texture		blue, buttery, smooth
Dropping point	D-2265	300 °C / 575 °F
Shear stability Cone penetration, 25 °C / °77 F after 60 / 1'000 / 10'000 strokes after 1'000 strokes, 50% H ₂ O	D-217	Typ HT 1.5 285-315/+1%/+2% 285-315
Roll stability	D-1831	+ 3 %
Extreme pressure properties Timken o.k.-load Four-ball wear test 1'800 min ⁻¹ , 435 N7mm ² LW-Index Weld point	D-2509 D-2266 D-2783	> 340 N 0.32 700+ N 5000+ N
Wheel breaking leakage > 163 °C / 325 °F, 660 min ⁻¹ , 6h	D-1263	0.4 %
Water washout 79 °C	D-1264	< 3.0 %
Rust test Synthetic seawater, 1 = o.k.	D-1743	1, 1, 1
Corrosion resistance Copper corrosion Bearing corrosion	D-1261 D-1743	pass pass
Oxidation loss 100 / 500 / 1'000 h	D-0942	0 / 0.14 / 0.62 bar
Low temperature torque - 40 °C (-100 °F) / 5 min / 10 min	D-1478	8.0 / 3.7 / 3.5
Evaporation loss 70 °C (160 °F) / 22h 100 °C (210 °F) / 22 h	D-972	0.35 % 0.85 %
NLGI-Consistency HT 1.5 EP-grease (standard) HT 0.5 EP-semi flow grease HT 000 EP-flow grease	D-217	NLGI-grades 1 und 2 0 und 00 000

To your attention: Information and data are based on investigations, reports and research results, from which we believe that they are reliable. They are indicated here without warranty and adhesion on our part and are intended for the user to the own investigation, check and evaluation

Last revision: March 2019, latest version online on www.metalon.ch

METALON

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METALON ® C2 Extreme Pressure oil

- Stops wear almost completely
- Protects metal surface during cold start
- Provides for smoother metal surface
- Reduces friction and heat generation
- Prevents blur of tools during metalworking



Application

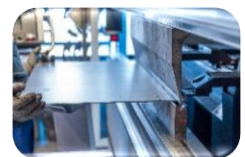
METALON C2 was originally designed to use in compressors and other closed systems without oil filtration. Therefore, it is particularly suitable for the protection of **2-stroke and "oldtimer" engines that do not have an oil filter system, gearboxes, hydraulic systems and differentials**. The product is particularly suitable for use in metalworking (cutting, shaping, pressing, etc.). Test results:

- Blended with a gas-oil mixture in two-stroke power saws: **10% more power**, elimination of vapor lock and substantial reduction of vibration.
- In most demanding Hydraulic Systems as Hydraulic Crans, Self-Loaders and Pumping units, the oil **temperature is regularly reduced by 25 °C**.
- In metal industries, **tool life is extended** and the surfaces are smoother



Miscibility

Metalon C2 is ideal for mixing with commercial cutting and other machining oils. When using specially designed machine oils, ask for advice



Dosage

For metal working, apparatuses of precision etc: Depending on the desired effect and the expected extreme load, Metalon C2 is dosed at 10 or 20%. In exceptional cases (precision mechanics, manual machining of stainless steel) Metalon C2 can also be used as concentrated.

For two-stroke engines: replace the half or all of mixture oil by METALON C2.

For 'Oldtimer' engines (before 1935, without oil filtration): put 10 % of the quantity of usual oil after oil change, for first treatment double quantity is recommended to reach fast effect.



Packages (Number per box)

250 Milliliter (10), 1 Liter (6), 5 Liter (1), 20 Liter (1). Other packages on request.



METALON

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METALON ® C2 Extreme Pressure oil

material safety data sheet (msds)

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Languages

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ASTM Specifications

Description	ASTM	Results
Specific density	D-1298	0.969 kg / dm ³
Color and appearance	D-1500	2.0 caramel, clear
Flash point concentrated product Mix of 10%	D-992	176 °C Not available
Pour point	D-97	- 34 °C
Flow limit	D-97	- 45 °C
Viscosity SUS 40°C	D-445	65.7 / 11.9 mm ² /s
Viscosity-Index		30.0
Rust test synthetic seawater	D-665	passed
Resistance against rust copper strip / 100 °C	D-130	1A passed
Foam-Test 1,2,3	D-892	0, 0, 0 passed
Ash content	D-482	0.01 % weight
Water content	D-96	0.00 % volume
Timken OK load and VKA	D-2271 D-2785	see TÜV assessment below

METALON ® was audited by TÜV Rheinland-Pfalz under another name. Due to the proven reduction in wear, the TÜV positively evaluated the test results. The methods used by TÜV are: ASTM D-2782 Timken and ASTM-D2785 VKA.

To your attention: Information and data are based on investigations, reports and research results, from which we believe that they are reliable. They are indicated here without warranty and adhesion on our part and are intended for the user to the own investigation, check and evaluation

Last revision: June 2021, latest version online on www.metalon.ch

METALON

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METALON ® M Extreme Pressure oil

- stops wear almost completely
- protects metal surface during cold start
- provides for smoother metal surface
- reduces friction and heat generation
- reduces the use of energy



Application

METALON M is specially developed for use in **4-stroke engines** as well as for "oldtimer" engines from 1935 onwards with oil filter systems. *For oldtimer-engines without oil filter systems (before 1935), gearboxes, hydraulic systems and differentials use METALON C2.*



Miscibility

METALON M is ideal for mixing with mineral and synthetic oils. METALON M is not efficient when mixed with aqueous solutions such as cooling emulsion in metalworking.



Dosage 4-stroke engines:

Normally, 10 % METALON M of the total content of the engine oil is sufficient to fully protect the engine. In problem cases and during initial application, up to 20 % of the oil content can be added to prevent further damage. For other applications, ask for advice.



Packages (Number per box)

250 Milliliter (10), 1 Liter (6), 5 Liter (1), 20 Liter (1), Other packages on request.



METALON

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METALON ® M Extreme Pressure oil

material safety data sheet (msds)

All safety data sheets can be found online on www.metalon.ch – we will also send you one along with your order.

REACH registration

The REACH Registration is NOT necessary for any of the METALON ® products. Delivery security within European Community is ensured.

Languages

The safety data and technical data sheets are available in German, French and English.

ASTM Specifications

Description	ASTM	Results
Specific density	D-1298	1.015 kg / dm ³
Color and appearance	D-1500	1.5 amber, clair
Flash point concentrated product Mix of 10%	D-992	94 °C > 180 °C
Pour point	D-97	- 40 °C
Flow limit	D-97	- 51 °C
Viscosity SUS 40°C 100°C	D-445	57.0 / 9.50 mm ² /s 29.0 / 1.90 mm ² /s
Viscosity-Index		30.0
Rust test synthetic seawater	D-665	passed
Resistance against rust copper strip / 100 °C	D-130	no corrosion
Foam-Test 1,2,3	D-892	0, 0, 0 passed
Ash content	D-482	0.6 % weight
Property under extreme pressure Timken concentration 5%	D-2782	> 300 N
Falex friction resistance clamp load 23.0 kN	D-2271	> 7.8 Nm

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Last revision: June 2021, latest version online on www.metalon.ch



... more than greasing

General Terms and Conditions

Scope

These general terms and conditions form the basis for all actions of BOHA AG. They are valid at the time of conclusion of the contract (verbally or in writing, also by e-mail) in their latest version for all business relations between BOHA AG and its customers.

Products

All products offered have been carefully selected and meet the quality requirements of BOHA AG. A product data sheet with detailed product information is available for each product.

Prices

Our prices are in Swiss francs for sales in Switzerland and include the statutory value-added tax and all other applicable charges (VOC, mineral oil tax, etc.). For foreign countries, the current prices in € or US-\$ apply. These are exclusive of value added tax.

Delivery

As soon as your order is received, we will contact you to set the delivery date. In exceptional cases there may be slight delays, about which we will keep you informed.

Guarantee and liability

We only deliver brand-new products. Should a product show defects despite careful examination, please contact us immediately. We refer primarily to the liability of the manufacturer. Our liability is excluded for damages, unless they are caused by an intentional or grossly negligent act on our part. The liability according to the product liability law remains in force.

The liability for any auxiliary persons called in is waived in accordance with Art. 101 Para. 2 OR. Therefore, no liability is assumed for the actions of BOHA AG auxiliary persons.

Payment

The payment of our products is made by invoice. The invoices are to be paid within the payment period. For products stocked in Dittingen, a discount of 3 % can be claimed if payment is made within 10 working days from an invoice amount of CHF 100.

Data protection

Data protection is very important to us. The data necessary for the business transaction will be treated strictly confidential and will not be passed on to third parties. We work according to the regulations on data protection.

Applicable law

All business activities of BOHA AG are subject exclusively to Swiss law. *Place of jurisdiction is Arlesheim, Switzerland*

BOHA AG, March 2020



... more than greasing

METALON ® SWISS is available at

METALON ® Swiss, BOHA AG

Baselstrasse 6A

4243 Dittingen

Switzerland

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info@metalon.ch



vCard – add us to your address book

We will gladly send you the current price list.