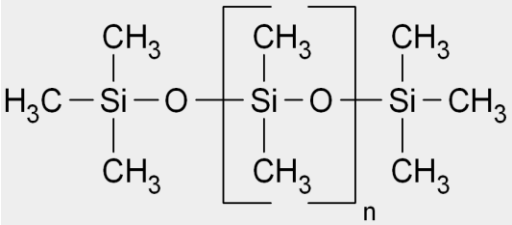
KORASILON® Fluids M

Short description

KORASILON® Fluids M are linear, clear, water-light polydimethyl-siloxanes and typically free of dispersed particles.

Product properties

The general chemical structure **KORASILON® Fluids M** is shown below:



In contrast to hydrocarbon chains of classical organic molecules, siloxane chains exhibits a pronounced chemical resistance against a wide range of chemical influences. Therefore **KORASILON® Fluids M** will not show typical decomposition processes like cracking or gumming.

Molecular weight and depending on this the viscosity of **KORASILON® Fluids M** is determined by the value of “n” describing the length of the siloxane chain. The following table is describing the correlation between viscosity, length of the molecular chain and molecular weight. The listed parameters for molecular weight an “n” are based on calculated averages.

Viscosity in mm²/s	Molecular weight	n
0,65	162	2
1	236	3
3	532	7
5	750	10
10	1200	16
20	1900	26
50	3200	43
100	5900	80
350	15000	203
500	18400	249
1.000	26500	358
5.000	50500	682
12.500	62000	838
30.000	76000	1.027
60.000	92000	1.243
100.000	103000	1.392
200.000	128000	1.730
300.000	143000	1.932
500.000	155000	2.095
1.000.000	175000	2.365
2.000.000	190000	2.568

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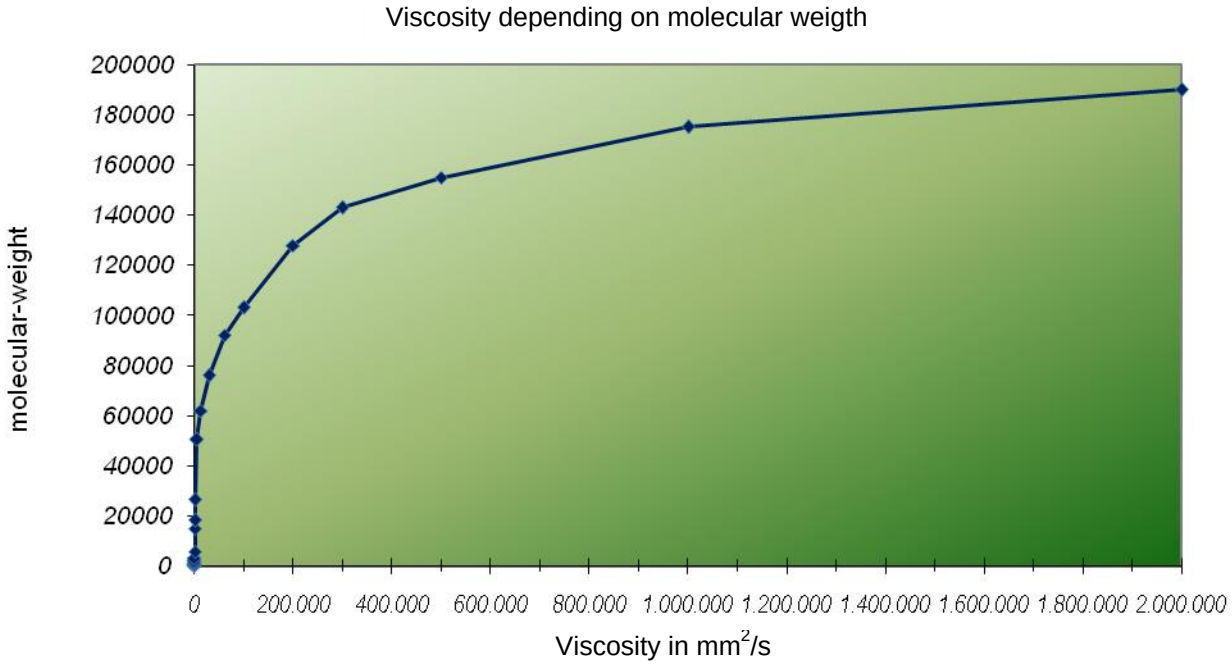

These inert and odourless fluids stand out pronounced lubricating properties and are suited especially for the use in polymer slide bearings or as a assembly aid for a multitude of technical application.

Owing to their separation properties in combination with excellent temperature stability **KORASILON® Fluids M** are suited for the use as release agents in different technical processes.

Key features:

KORASILON® Fluids M stand out by the following parameters:

- Low dependency of viscosity from temperature
- Usable in a wide temperature range, showing a unique combination of low pour points with low vapour pressures and high flash points
- Good thermal long time durability
- Good oxidation durability
- Low chemical reactivity
- High flash point
- Low surface tension
- High shear stability
- High compressibility
- Good heat conductivity
- High compatibility with a wide range of different material
- Cause no metal corrosion
- Excellent water repellent properties

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Fields of application:

KORASILON® Fluids M are suitable for a wide range of different applications, which are listed in the following in excerpts.

Application as filling for mechanical parts

- Damping fluid (e. g. for nautical or aeronautical instruments, compensators and shock absorbers, transducers)
- Filling for gearbox-components (e.g. torsion dampers, visco couplers, speed governors)
- Hydraulic fluid for shock absorbers, pumps or brake cylinders

In this context, the compressibility is of importance. The table below shows the adiabatic compressibility in m^2N^{-1}.

KORASILON® Öl	Adiabatische Kompressibilität in m^2N^{-1}
M 50	101,6E-11
M 100	100,8E-11
M 350	100,0E-11
M 500	99,8E-11
M 1.000	99,8E-11

Application as lubricating aid

- Lubricant or assembly aid for plastic and rubber parts
- Wear minimization for cutting tools
- Component of silicon greases for the use with non-metal parts (please refer also to the technical data sheet "**KORASILON® Pastes**")

Application as defoaming agent

- Use as antifoam for non water based systems and preparations
- Use as antifoam for petrochemical products or in the range of petrochemical processes
- Component of antifoam compounds for the use in water based applications

Application as dielectric fluid

Since electrical properties of **KORASILON® Fluids M** remain rather independent over a wide temperature and frequency range, **KORASILON® Fluids M** are suited well for the use within:

- Coolant for transformer, capacitors, magnetrons or high voltage tubes.
- Insulation fluid e.g. for cable termination boxes
- Assembly aid and lubricant for cable systems

Application in care formulations

- Part of polish or care formulations to improve shine and stain resistance
- Component of cosmetic formulations [INCI-Name: *„Dimethicone"*]

Application as release agent

- Release agent for different plastic and rubber products
- Release agent for tire processing
- Release agent for mineral parts like e. g. sand-cast, green-compacts etc.

Application in textile industry

- Lubricant for fibre and yarn
- Component of lubricating formulations
- Part of formulations for surface modification of fibres or textiles e. g. soft touch

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Application as paint additive

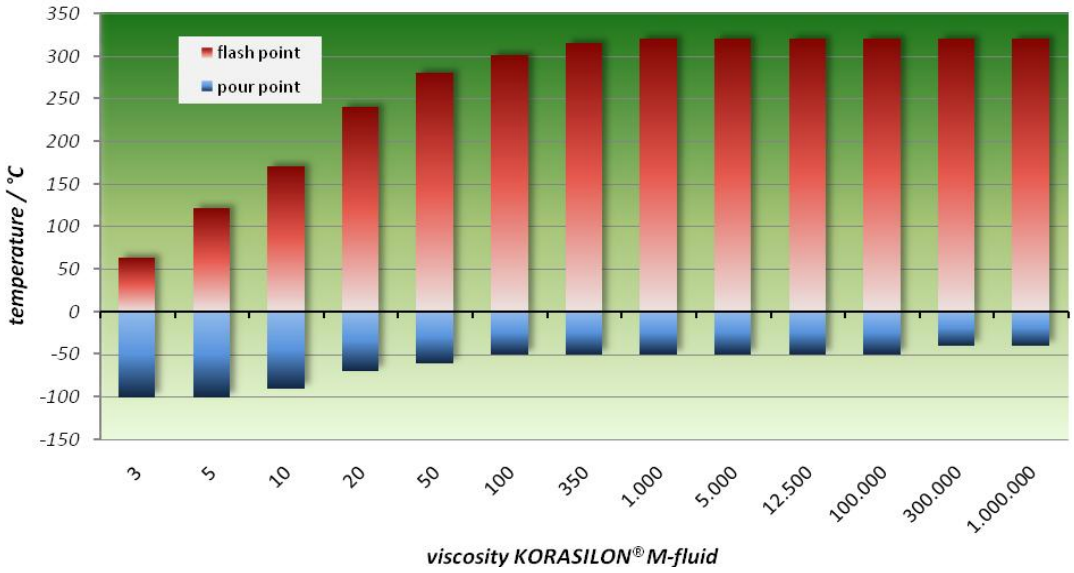
- Additive to improve shine and „slip“
- Additive to improve colour distribution

Application in plastic industry

- Release agent for extrusion processes
- Lubricant and release agent for wire and cable manufacturing
- Release agent for moulds
- Intrinsic lubricant for bearing material and gear box parts

Physical and chemical properties

Pour- and flash-points



Dependency of viscosity from temperature

Temp. [°C]	-80	-60	-40	-20	0	25	40	60	80	100	120	140
Viscosity [mm²/s]												
3	70	28	13	7	4,6	3	2,4	1,8	1,5			
5	132	50	23	14	7,8	5	4	3,1	2,6	2,2		
10		120	52	27	16	10	7,9	6	4,9	4	3,1	2,7
20		270	100	57	34	20	15,2	11,8	9,2	7,2	6	5
50				150	85	50	40	28	20	16	13	10
100				290	170	100	75	55	41	32	27	21
350				1000	620	350	290	200	150	125	95	75
500				1300	850	500	400	290	210	165	140	110
1000				2900	1850	1000	750	520	400	300	230	190
5000					8500	5000	3800	2800	2000	1600	1200	1000
12500					20000	12500	9800	7000	5100	4000	3000	2400
30000					50000	30000	22000	16500	11500	8500	7000	5000
60000					100000	60000	42000	30000	20000	15500	11000	9000
100000					180000	100000	75000	55000	40000	30000	22000	17000
300000					500000	300000	200000	175000	133000	100000	78000	62000
1000000					2000000	1000000	750000	520000	390000	280000	210000	160000

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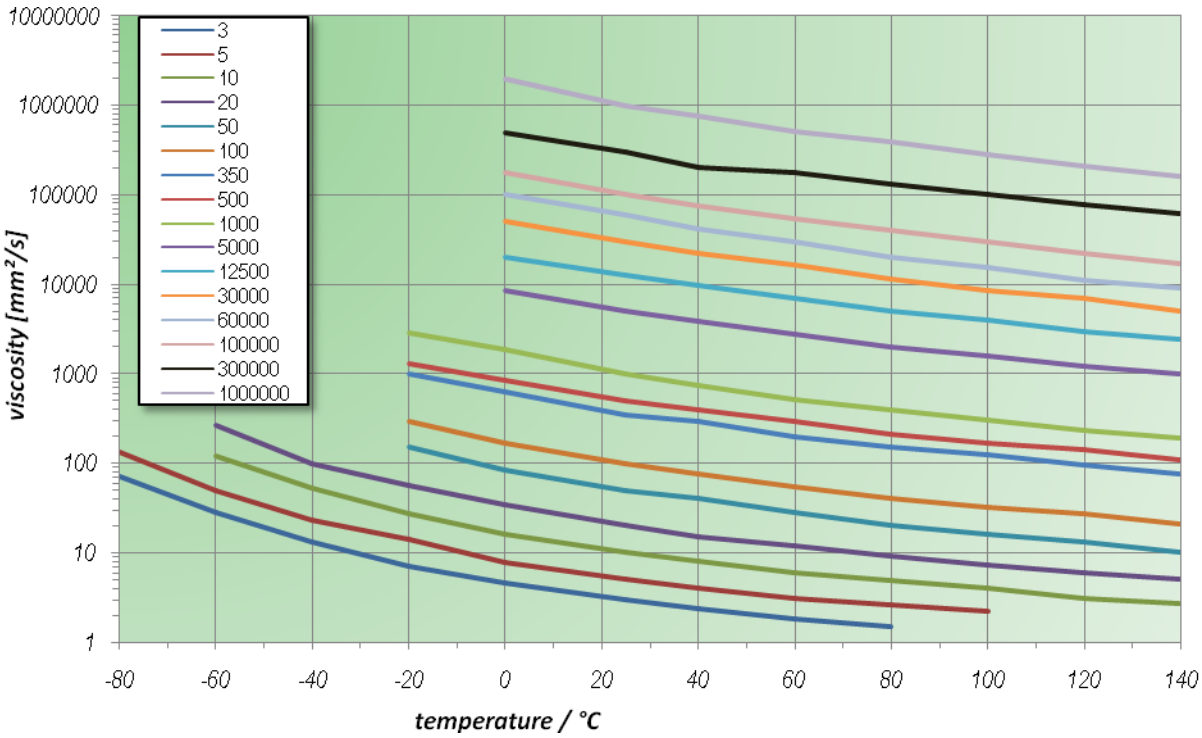
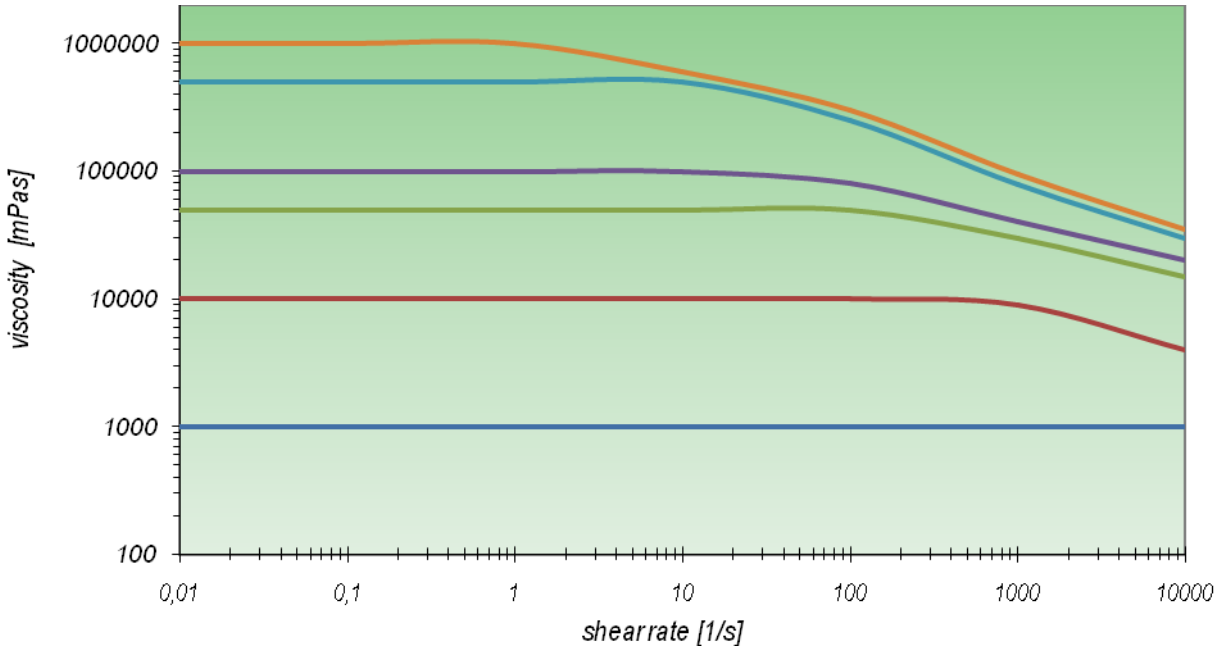


Dependency of viscosity from shear stress



It can be seen in general, that with increasing viscosity of the **KORASILON® Fluid M** the *Newtonian area*, the interval where viscosity is independent from shear rate (indicated by the horizontal part of the curve) is decreasing, while shear thinning behaviour (viscosity is decreasing with increasing shear rate) is becoming more and more evident.

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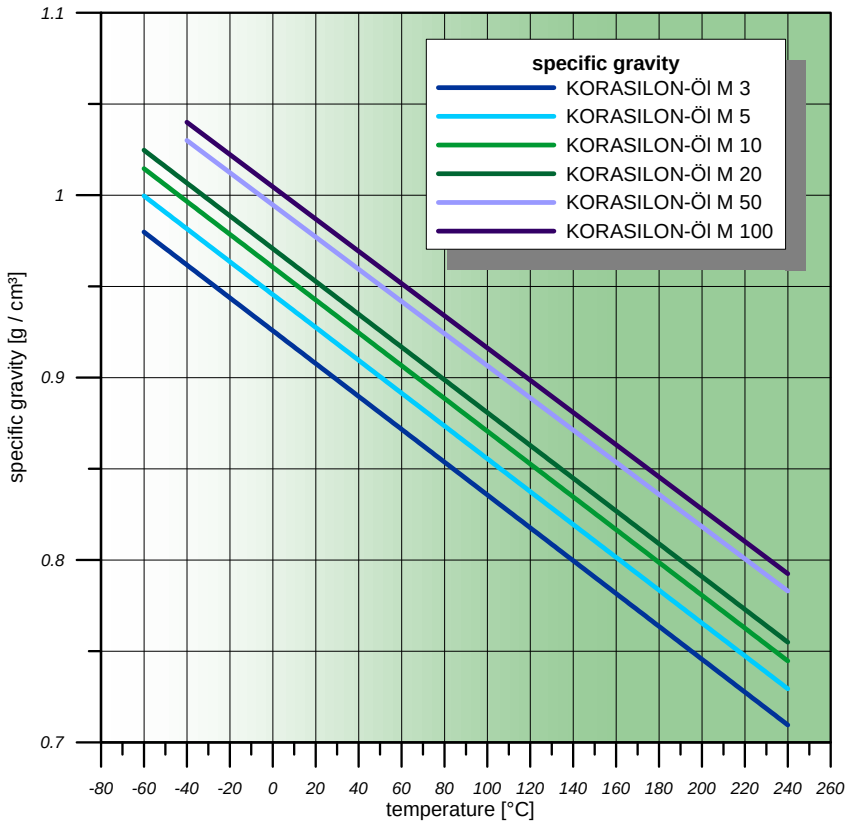
Temperature dependency of specific gravity



The temperature/specific-density curve of **KORASILON® Fluid M 100** is describing the temperature dependency of any **KORASILON® Fluid M** with viscosities higher than 100 mm²/s.

Solubility

KORASILON® Fluids M are nonpolar and they are not mixable with water.

Small water quantities up to 250 ppm, depending on temperature and ambient humidity, may be dissolved in **KORASILON® Fluids M**. Regarding applications using **KORASILON® Fluids M** as carrier fluids for cooling systems or in electrical installations or electrical systems we recommend the use of special product qualities, which will be presented to you on request.

KORASILON® Fluids M are practically insoluble in short chained alcohols (Methanol, Ethanol, Isopropanol). Same is true for long chained hydrocarbons, like white oil, mineral oils, waxes, vegetable oil, animal fats or fatty acids or for fluids belonging to the chemical group of glycols.

With typical aliphatic or aromatic solvents or with halogenated solvents **KORASILON® Fluids M** show unlimited miscibility. Same is true for long chained alcohols, long chained ketones (as Methyl-Ethylketone or Methylisobutylketone). In some petroleum fractions like napthenes only a limited solubility is observed, which in most cases is sufficient for many technical applications.

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Solubility of gases

KORASILON® Fluids M are capable of dissolving relatively large quantities of gas. For **KORASILON® Fluids M** with viscosities of 100 mm²/s and above, these values are independent from oil viscosity.

For nitrogen and oxygen gas solubility is largely independent from temperature, while carbon dioxide is showing a pronounced dependency of solubility from temperature.

In the following table exemplary values for **KORASILON® Fluid M 100** are shown for ambient pressure:

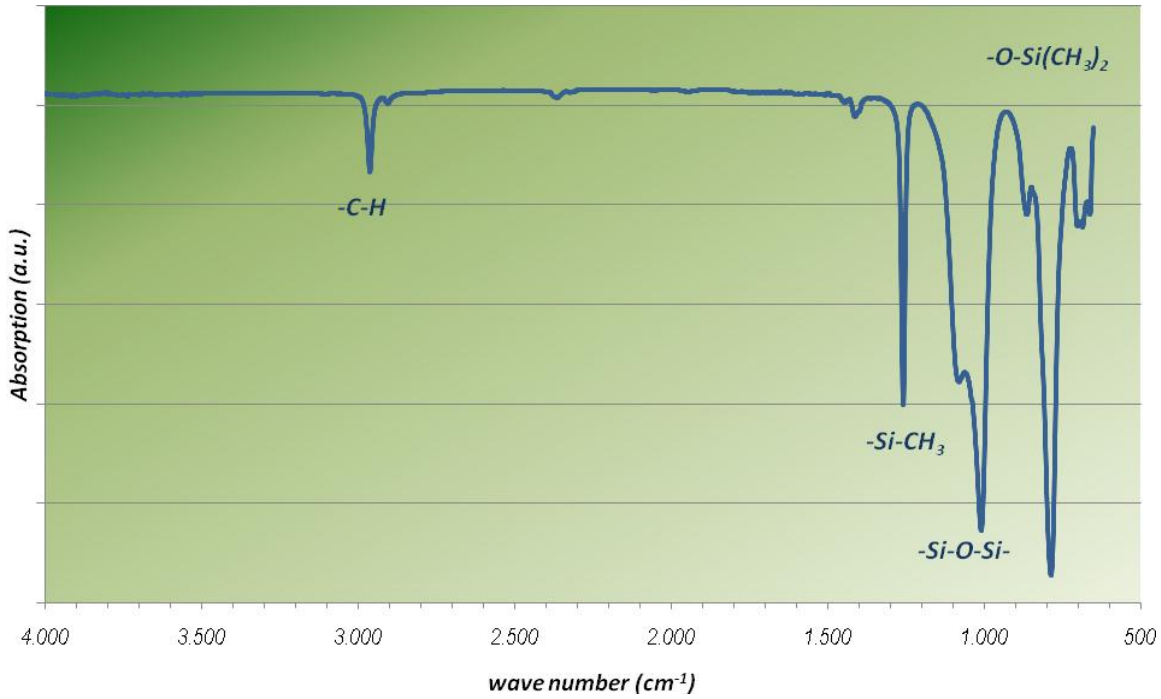
	0 °C	25 °C	100 °C	200 °C
Oxygen*	0,25	0,24	0,24	0,22
Nitrogen*	0,13	0,18	0,19	0,24
Carbondioxide*	2,30	1,88	1,00	0,56

*Values in cm^3/g

Spectroscopic properties

KORASILON® Fluids M are light and transparent, thus thin films of these fluids do not absorb radiation in the visible range of light. In the UV-Range transmission is reduced for wavelength below 250 nm and wavelength below 200 nm are not transmitted at all.

The following IR-Spectrum of **KORASILON® Fluid M 350** is presenting the typical appearance of IR-Spectra of the **KORASILON® Fluids M**. This spectrum was recorded in ATR and not in transmission mode.



Temperature durability

KORASILON® Fluids M

KORASILON® Fluids M may be used in systems with air contact up to 150 °C without limitation. Using **KORASILON® Fluids** beyond this temperature and for a longer period of time, will lead – depending on working temperature and time – to a geling process and finally to a complete solidification of the fluid.

The following results obtained for **KORASILON® Fluid M 100** may be used for reference:

Temperature	250 °C	300 °C	350 °C
Geling time in hours	approx. 240	approx. 24	< 1

Without air contact the working temperature limit increases up to 200-250 °C and may be increased up to 300 °C using inert gases like argon, carbondioxide or nitrogen. In contrast to the solidification process occurring at elevated temperatures under unlimited air contact, a depolymerisation – notable by decreasing viscosity- occurs.

Durability against acids and bases

In general **KORASILON® Fluids M** are chemically indifferent. However **KORASILON® Fluids M** will be attacked by concentrated lye, concentrated oxidising acids, chlorine gas or concentrated hydrochloric acid, especially at elevated temperatures.

Pharmaceutical grades

Because of their special properties, their good cutaneous tolerance, their excellent toxicological profile und the resulting physiological harmlessness Polydimethylsiloxanes are suitable for different pharmaceutical applications und listed in different pharmaceutical monographs.

Due to this we offer **KORASILON® Fluids M** and the label **KORASILON® Fluids MPH** in a special quality according to the requirements of the European Pharmacopoe and with more detailed certificates of analysis.

As standard we offer **KORASILON® Fluids MPH** with a viscosity range of 20 to 1000 mm²/s according to the monograph '*Dimethicon/Dimethiconum'* of the European Pharmacopoe. If you are interested in this product range, please order our additional information material for this application.

Additionaly we offer higher viscous **KORASILON® Fluids MPH** in the viscosity range from 1.000 up to 30.000 mm²/s according to the monograph '*Silicone fluid for the use as lubricant'.* If you are interested in our higher viscous silicone fluids for the use in pharmaceutical applications please contact our sales personal directly.

ORC process

For ORC processes we recommend, due to the physical properties, such as the lower pressure development at elevated temperatures and non-corrosive properties, our **KORASILON® Fluids M 0.65** and **M 1**. In addition, the molar masses of these fluids are significantly higher, which lead to more economical dimensions of the installation plant and to an improved economic efficiency of the process.

Electrical applications

KORASILON® Fluid MKI 50 shows a viscosity of 50 mm²/ s and is suitable for use as a coolant and insulation fluid in transformers or capacitors. This oil has an extremely low water content below 50 ppm which ensures a high breakdown voltage of >40 kV. If desired, other oil viscosities can be checked for water content.

If you require more information, please ask for a separate product data sheet.
Technical data*

KORASILON® Fluids M

KORASILON Öl M	Viscosity bei 25 °C	Specific gravity at 25 °C	Heat expansion coefficient from 0 - 150 °C	Thermal conductivity at 50 °C	Flash point	Pour point below	Refractive index at 25 °C	Dielectric constant at 25 °C and 10^2 Hz	Surface tension at 25 °C
	[mm²/s]	[g/cm³]	[10^{-4}cm³ / cm³ °C]	[W / K x m]	[°C]	[°C]			[mN/m]
0,65	0,65	0,76	13,4	0,10	-4	approx. - 70	1,375	2,18	15,9
1	1	0,82	12,9	0,10	approx. 30	approx. -86	1,382	2,28	16,9
2	2	0,87	12,4	0,11	75	approx. -120	1,319	2,30	18,3
3	3	0,90	11,1	0,11	> 62	approx. -100	1,394	2,40	18,9
5	5	0,92	10,8	0,12	> 120	approx. -100	1,396	2,49	19,2
10	10	0,93	10,0	0,13	> 165	approx. -90	1,399	2,61	20,2
20	20	0,95	9,7	0,14	> 200	approx. -70	1,401	2,68	20,6
50	50	0,96	9,5	0,14	> 250	approx. -55	1,402	2,69	20,8
100	100	0,97	9,4	0,15	> 275	approx. -55	1,403	2,71	20,9
350	350	0,97	9,3	0,15	> 300	approx. -50	1,4035	2,73	21,1
500	500	0,97	9,3	0,15	> 300	approx. -50	1,4035	2,74	21,1
1 000	1 000	0,97	9,2	0,15	> 300	approx. -50	1,4035	2,74	21,2
5 000	5 000	0,97	9,2	0,15	> 300	approx. -50	1,4035	2,74	21,4
10 000	10 000	0,97	9,2	0,15	> 300	approx. -45	1,4037	2,75	21,5
12 500	12 500	0,97	9,2	0,15	> 300	approx. -45	1,4037	2,75	21,5
20 000	20 000	0,97	9,2	0,15	> 300	approx. -45	1,4037	2,76	21,5
30 000	30 000	0,97	9,2	0,15	> 300	approx. -45	1,4037	2,76	21,5
60 000	60 000	0,97	9,2	0,15	> 300	approx. -45	1,4037	2,76	21,5
100 000	100 000	0,97	9,2	0,15	> 300	approx. -40	1,4037	2,76	21,5
300 000	300 000	0,97	9,2	0,15	> 300	approx. -40	1,4037	2,76	21,5
500 000	500 000	0,97	9,2	0,15	> 300	approx. -40	1,4037	2,76	21,5
600 000	600 000	0,97	9,2	0,15	> 300	approx. -40	1,4037	2,76	21,5
1 000 000	1 000 000	0,97	9,2	0,15	> 300	approx. -40	1,4037	2,76	21,5
2 000 000	2 000 000	0,97	9,2	0,15	> 300	approx. -40	1,4037	2,76	21,5
G 30 M	30 000 000	0,97	9,2	0,15	> 300	-	1,4037	2,76	21,5

Storage

Correctly stored at temperatures between **+5** °C and **+40** °C in the unopened original container **KORASILON® Fluids M** have a shelf life of **24** months.

Storage beyond to the period indicated on the product label does not automatically mean that the product is unusable. However, an inspection of the property values necessary for the intended use is essential for quality assurance reasons.

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Miscellaneous

Special formulations founding on **KORASILON® Fluids M** are available on request.

- coloured liquids applicable for e. g.:
    - decorative purposes (in contrast to water no evaporation will occur))
    - differentiation between different viscosities

- flavoured fluids
- intermediate viscosities
- specialized fluids with improved thermal stability (s. sep. product data sheet)
- specialized fluid for the use in electrical systems
- specialized fluids for the use as heat transfer fluids with a wide temperature range

In case of interest in these special formulations please turn to our sales personal or ask for additional information material.

Further information on product safety and handling is given in the Material Safety Data Sheet.

This information and our technical advice – whether verbal, in writing or by way of trials – are given in good faith but without warranty, and this also applies where proprietary rights of third parties are involved. Our advice does not release you from the obligation to check its validity and to test our products as to their suitability for the intended processes and uses. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. Our products are sold in accordance with our General Conditions of Sale and Delivery; this is not valid for our trial products

*Informative properties not intended to be used as product specification

Kurt Obermeier GmbH & Co. KG, Berghäuser Str. 70, D-57319 Bad Berleburg Tel.: +49 (0) 2751/524-0, Fax.: + 49 (0) 2751/5041, e-Mail: info@obermeier.de www.obermeier.de