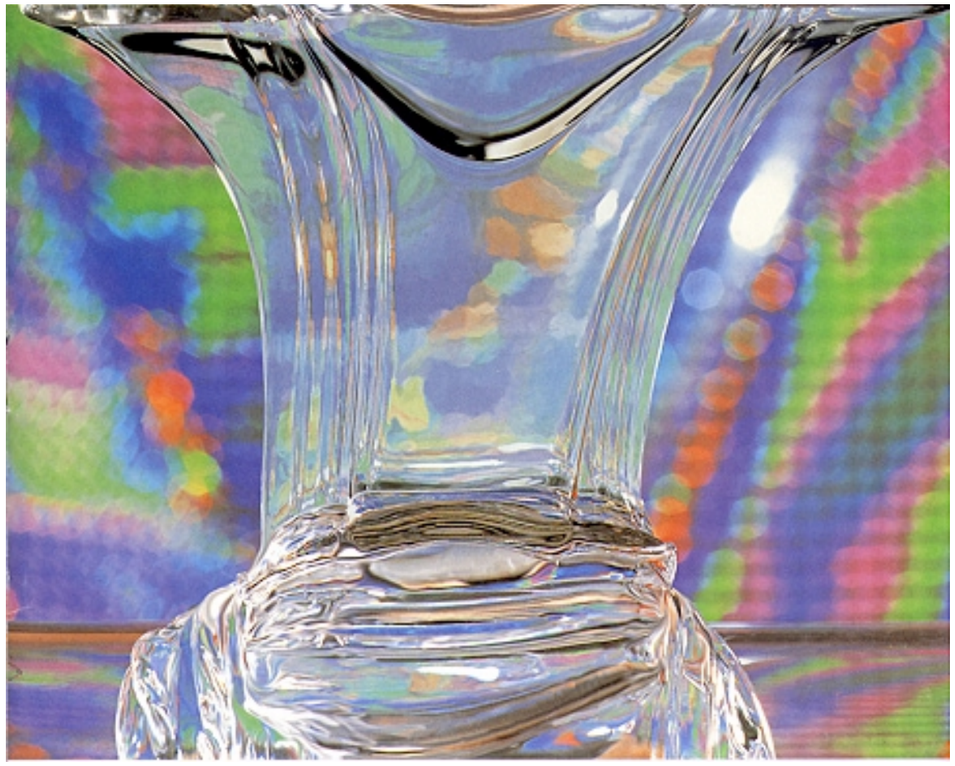

Wacker Silicone Fluids AK

WACKER

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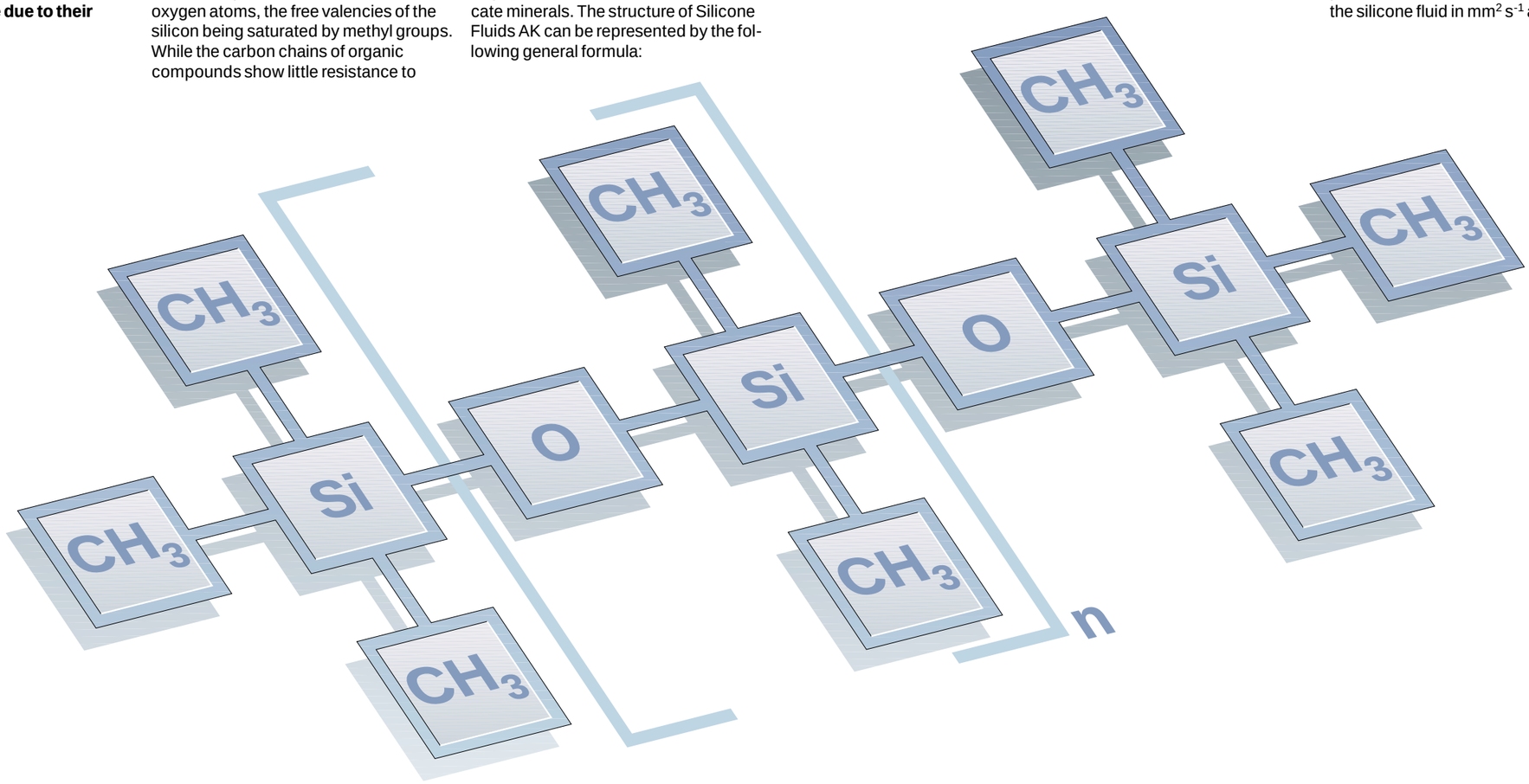
Chemical Structure

Silicone Fluids AK are clear liquids supplied in viscosities ranging from 0.65 to 1 000 000 $mm^2 s^{-1}$. Their unique properties are due to their molecular structure.

Wacker Silicone Fluids AK are dimethyl polysiloxanes whose unbranched chains are made up of alternate silicon and oxygen atoms, the free valencies of the silicon being saturated by methyl groups. While the carbon chains of organic compounds show little resistance to certain external influences, the stability of inorganic Si-O linkages is, in many ways, like the chemical inertness of silicate minerals. The structure of Silicone Fluids AK can be represented by the following general formula:



The molecular weight, which determines the viscosity of Silicone Fluids AK, is governed by the number "n" of dimethylsiloxane units in the molecule. Even if Silicone Fluids AK contain more than 2 000 such groups, they are still liquid at room temperature. As the molecular weight increases, soft, slightly sticky substances are formed which, however, are still capable of flowing. The adjacent table shows the relationship between the viscosity and the molecular size of dimethyl silicone fluids of the chemical structure shown above.

The figures given for molecular weight and "n" are calculated mean values.

Viscosity [$mm^2 s^{-1}$]	n	Molecular weight
0.65	0	162
50	40	3 000
100	70	5 000
1 000	200	15 000
10 000	500	37 000
100 000	1 000	74 000

Our Product Range

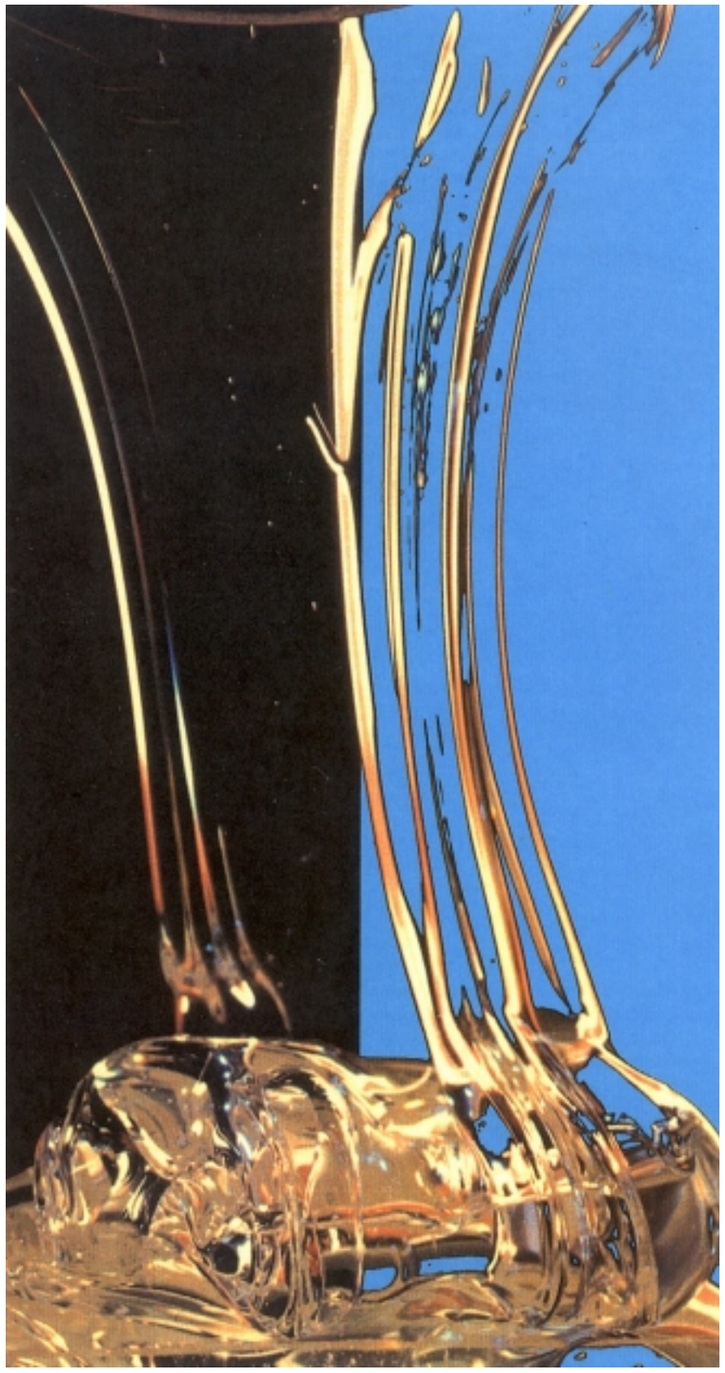
We produce Wacker Silicone Fluids AK in a range of viscosities. The following product codes indicate the viscosity of the silicone fluid in $mm^2 s^{-1}$ at 25 °C.

AK	0,65
AK	5
AK	10
AK	20
AK	35
AK	50
AK	100
AK	150
AK	200
AK	250
AK	350
AK	500
AK	1 000
AK	2 000
AK	5 000
AK	10 000
AK	12 500
AK	20 000
AK	30 000
AK	60 000
AK	80 000
AK	100 000
AK	200 000
AK	300 000
AK	500 000
AK	600 000
AK	1 000 000

Storage stability

Silicone Fluids AK have a shelf life of at least 12 months if stored in originally sealed containers between 5 °C and 30 °C.The “Best use before end” - date of each batch is shown on the product label.
If the material is kept beyond the shelf life recommended on the product label, it is not necessarily unusable, but a quality control should be performed on the properties relevant to the application.

Description of Wacker Silicone Fluids AK



Blending of Wacker Silicone Fluids AK

In addition to the listed grades of Wacker Silicone Fluids AK we can supply special viscosities on request. If silicone fluids with viscosities other than those indicated are required, the desired viscosities can be achieved by blending. All Wacker Silicone Fluids AK have the same chemical structure and are therefore miscible in any proportion. The mixing ratios of the individual components can be obtained from the diagram opposite.

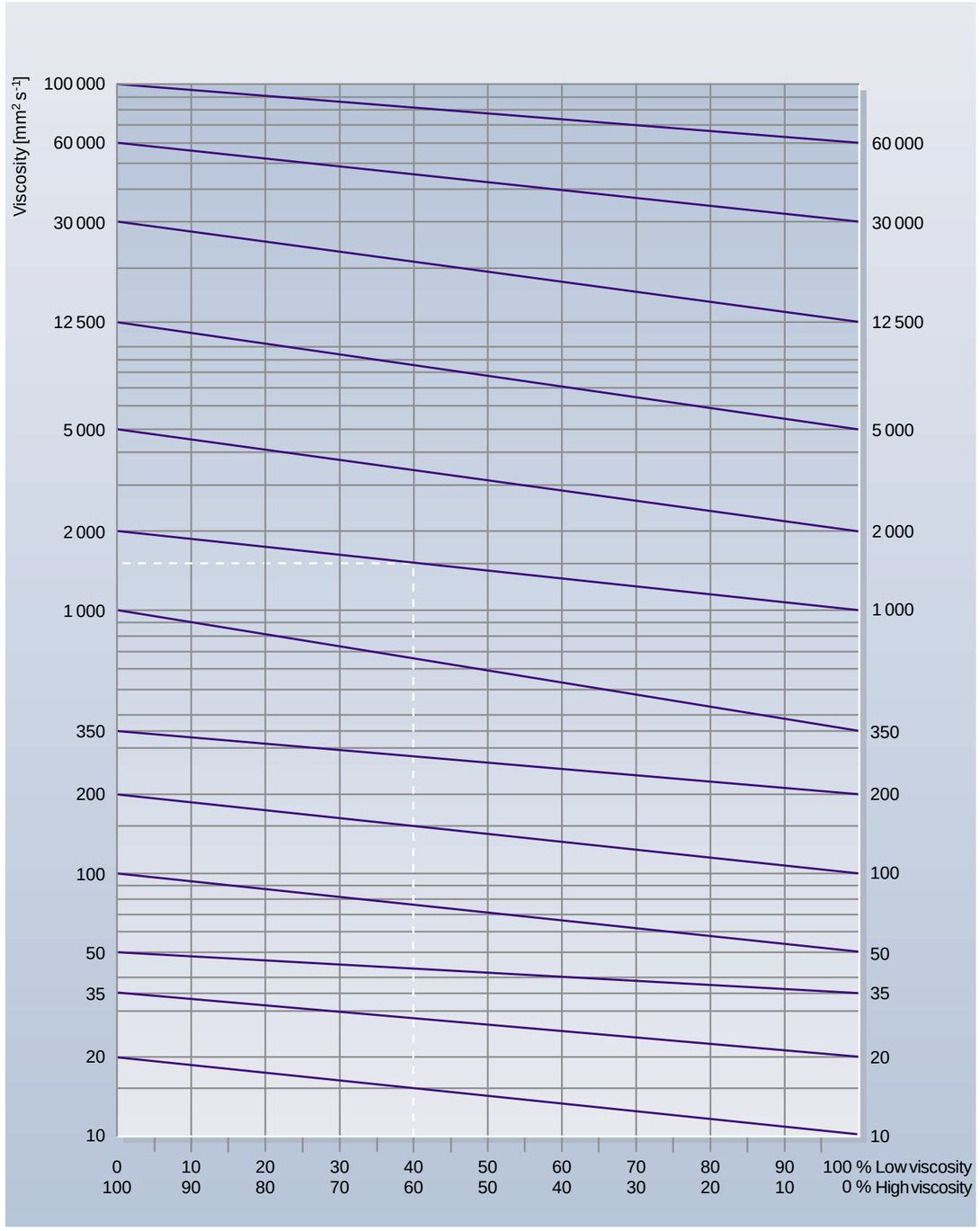
To achieve the required viscosity, it is best to blend standard viscosity silicone fluids. To obtain a silicone fluid with a viscosity of 1 500 $mm^2 s^{-1}$ at 25 °C, products with viscosities closest to this figure should be used, ie, AK 1 000 and AK 2 000.

In the adjoining diagram a horizontal dashed line is first drawn from the point equivalent to 1 500 $mm^2 s^{-1}$ (ie, the required viscosity). From the point at which the dashed line intersects the connecting line between the two standard viscosities, a vertical dashed line is drawn to meet the percentage scale which indicates the amounts of high and low viscosity silicone fluids that have to be mixed to obtain the desired viscosity.

In the example given, 40 wt % of the low viscosity silicone fluid (ie, AK 1 000) and 60 wt % of the high viscosity one (ie, AK 2 000) are needed.

Properties

The most important characteristics of Wacker Silicone Fluids AK are described in the following pages. A summary of the most important physical properties is given on pages 6 and 7. The properties of the higher viscosity grades – from about AK 100 – show only minor differences.



Physical Properties of Wacker Silicone Fluids AK

Viscosity at 25 °C[1]		Viscosity-temperature coefficient[2]	Density at 25 °C	Coefficient of thermal expansion at 0 – 150 °C	Thermal conductivity at 50 °C	Flash point ISO 2592 acc. to Cleveland	Pour point DIN 51794	Volatility[4]	Brechungs-index bei 25 °C	Refractive index at 25 °C and 10^2 Hz	Surface tension at 25 °C DIN 53 914
Kinematic	Dynamic										
[$mm^2 s^{-1}$]	[mPa · s]		[g/cm^3]	$\left[\frac{cm^3}{cm^3 \cdot °C} \cdot 10^{-4}\right]$	[$W \cdot K^{-1} \cdot m^{-1}$]	[°C]	[°C]	[%]			[mN/m]
0,65	0,6	–	0,76	–	0,10	–1[3]	–68	Kp100 °C/1 bar	1,375	2,18	15,9
5	4,6	–	0,92	–	0,12	> 130	< –80	< 4 (1h/150 °C)	1,396	2,49	19,2
10	9,3	0,56	0,93	10,0	0,13	> 165	< –80	< 1 (1h/150 °C)	1,399	2,61	20,2
20	19	0,575	0,945	9,7	0,14	> 200	< –70	< 1 (1h/150 °C)	1,401	2,68	20,6
35	33	0,585	0,955	9,5	0,14	> 235	< –60	< 6	1,402	2,69	20,7
50	48	0,59	0,96	9,5	0,15	> 250	–55	< 2	1,402	2,71	20,8
100	96	0,59	0,963	9,4	0,15	> 275	–55	< 1,5	1,403	2,73	20,9
150	145	0,595	0,965	9,3	0,15	> 300	–50	< 1,5	1,403	2,73	21,0
200	193	0,595	0,966	9,3	0,15	> 300	–50	< 1,5	1,403	2,73	21,0
250	240	0,595	0,967	9,3	0,15	> 300	–50	< 1,5	1,403	2,73	21,0
350	340	0,595	0,968	9,25	0,15	> 300	–50	< 1,5	1,4035	2,73	21,1
500	485	0,60	0,969	9,25	0,15	> 300	–50	< 1,5	1,4035	2,74	21,1
1 000	970	0,60	0,97	9,2	0,15	> 320	–50	< 1,5	1,4035	2,74	21,2
2 000	1 940	0,60	0,97	9,2	0,15	> 320	–50	< 1,5	1,4037	2,74	21,3
5 000	4 850	0,60	0,97	9,2	0,15	> 320	–50	< 1,5	1,4037	2,74	21,4
10 000	9 700	0,60	0,97	9,2	0,15	> 320	–45	< 1,5	1,4037	2,75	21,5
12 500	12 100	0,60	0,97	9,2	0,15	> 320	–45	< 1,5	1,4037	2,75	21,5
20 000	19 400	0,60	0,97	9,2	0,15	> 320	–45	< 1,0	1,4037	2,76	21,5
30 000	29 100	0,60	0,97	9,2	0,15	> 320	–45	< 1,0	1,4037	2,76	21,5
60 000	58 200	0,60	0,97	9,2	0,15	> 320	–45	< 0,75	1,4037	2,76	21,5
80 000	77 600	0,60	0,97	9,2	0,15	> 320	–45	< 0,75	1,4037	2,76	21,5
100 000	97 000	0,60	0,97	9,2	0,15	> 320	–40	< 0,75	1,4037	2,76	21,5
200 000	194 000	0,60	0,97	9,2	0,15	> 320	–40	< 0,75	1,4037	2,76	21,5
300 000	290 000	0,60	0,97	9,2	0,15	> 320	–40	< 0,75	1,4037	2,76	21,5
500 000	485 000	0,60	0,97	9,2	0,15	> 320	–40	< 0,75	1,4037	2,76	21,5
600 000	582 000	0,60	0,97	9,2	0,15	> 320	–40	< 0,75	1,4037	2,76	21,5
1 000 000	970 000	0,60	0,97	9,2	0,15	> 320	–40	< 1,0	1,4037	2,76	21,5

1) The tolerance for up to 50 $mm^2 s^{-1}$ is ± 10 %, for higher viscosity fluids ± 5 %

2) Viscosity-temperature coefficient: $1 - \frac{\text{kinematic viscosity at 99 °C}}{\text{kinematic viscosity at 38 °C}}$

3) Flash point determination in accordance with DIN 51 755

4) Percentage weight loss of a 5-g sample weighed into a 10-cm^3 metal capsule and heated at 230 °C for two hours

All figures are intended as a guide and should not be used in preparing specifications.

Viscosity

Dependence on temperature

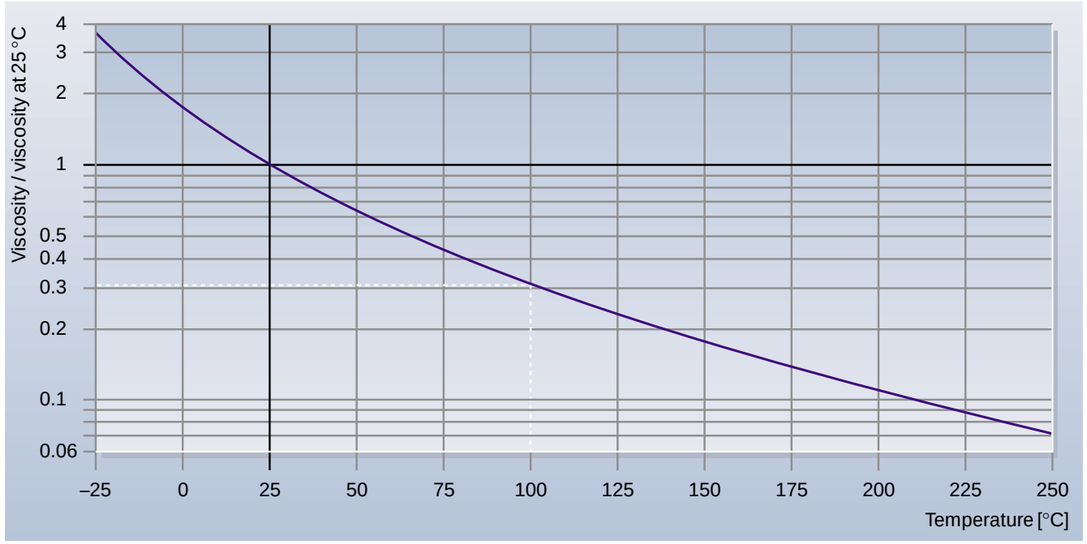
As with all liquids, the viscosity of Wacker Silicone Fluids AK varies with temperature, but not nearly as much as that of mineral oils, for example, as is shown by the following comparative figures:

At room temperature, both fluids have the same viscosity, but between –25 and 120 °C, the viscosity of the mineral oil changes much more than that of the silicone fluid. The viscosity-temperature coefficient (VTC) is a measure of the relationship between viscosity and temperature. This is

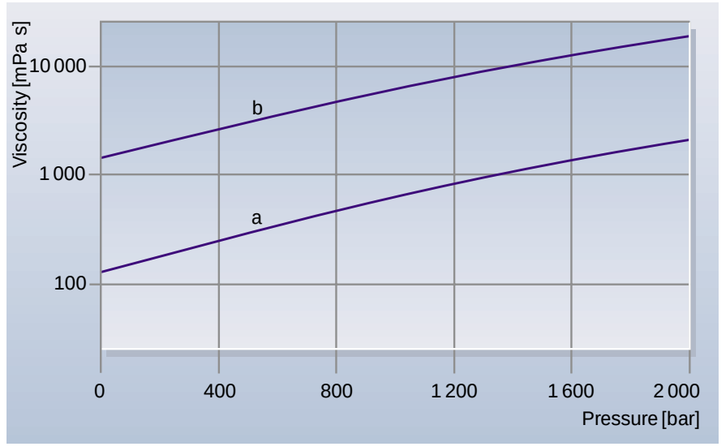
Viscosity in $mm^2 s^{-1}$ at	–25 °C	25 °C	120 °C
Wacker Silicone Fluid AK 100	350	100	25
Engine oil SAE 10	5 000	100	5

$$\text{VTC} = 1 - \frac{\text{Viscosity [mm}^2\,\text{s}^{-1}\text{] at 99 °C}}{\text{Viscosity [mm}^2\,\text{s}^{-1}\text{] at 38 °C}}$$

The VTC increases with increasing viscosity and reaches a maximum value of 0.60 at 100 $mm^2 s^{-1}$. In other words, for Wacker Silicone Fluids with viscosities > 100 $mm^2 s^{-1}$, the temperature dependence of the viscosity is the same. For silicone fluids with viscosities below 100 $mm^2 s^{-1}$, the VTC can be taken from the table on p. 6.The diagram below shows the kinematic viscosity of Wacker Silicone Fluids AK ≥ 100 $mm^2 s^{-1}$, divided by the kinematic viscosity at 25 °C, as a function of temperature.



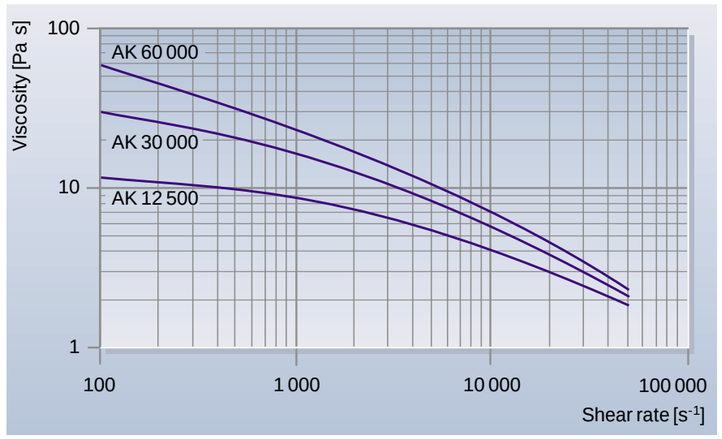
Example:
A Wacker Silicone Fluid AK has a kinematic viscosity of 500 $mm^2 s^{-1}$ at 25 °C.
At 100 °C, visc. (100 °C)/visc. (25 °C) = 0.31.
The viscosity at 100 °C is visc. (100 °C) = 0.31 x visc. (25 °C) = 155 $mm^2 s^{-1}$.



Effect of pressure

The viscosity of Wacker Silicone Fluids AK increases with increasing pressure – but less so than in the case of mineral oils. When oils with viscosities ≥ 1 Pa s are subjected to a pressure of 450 bar, their viscosity will increase by a factor of 2.

Example:
Effect of pressure on the viscosity of two silicone fluids at 25 °C, according to KUSS
a) 130 mPa s, b) 1 400 mPa s



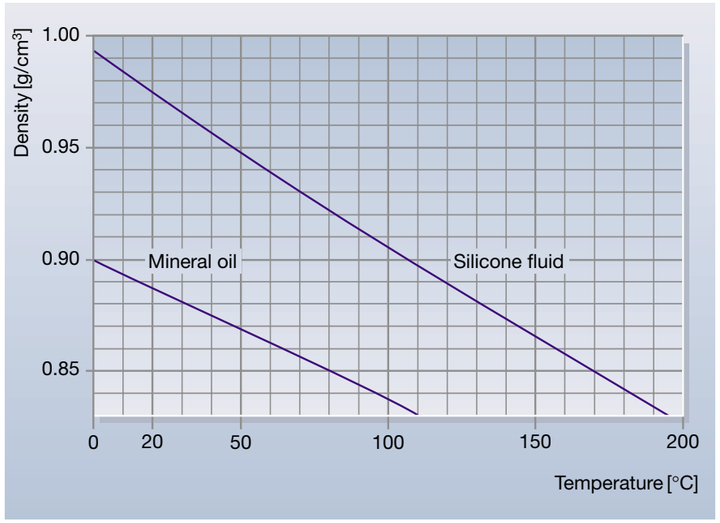
Effect of shear

All Wacker Silicone Fluids AK up to AK 1 000 behave almost like Newtonian liquids, ie, their viscosity is unaffected by shear. High-viscosity silicone fluids show non-Newtonian, or pseudoplastic behaviour, ie, their viscosity decreases with increasing shear.

Density

Dependence on viscosity

The density of Wacker Silicone Fluids AK increases with increasing viscosity, attaining a maximum value of 0.97 g cm^{-3} at 25 °C at a viscosity of about 500 $mm^2 s^{-1}$ (see p. 6).



Dependence on temperature

Temperature has a greater effect on the density of Wacker Silicone Fluids AK than on that of mineral oils. Temperature dependence decreases with increasing density – and with increasing viscosity. At a density of 0.97 g cm^{-3} and a viscosity of ≥ 500 $mm^2 s^{-1}$ the coefficient of thermal expansion attains the minimum value of 0.00092/°C (see p. 6). The temperature-density relationship is almost linear.

The density r [g cm^{-3}] of a Wacker Silicone Fluid AK with viscosity ≥ 500 $mm^2 s^{-1}$ at temperature T [°C] (–20 °C to 200 °C) can be calculated from the following formula:

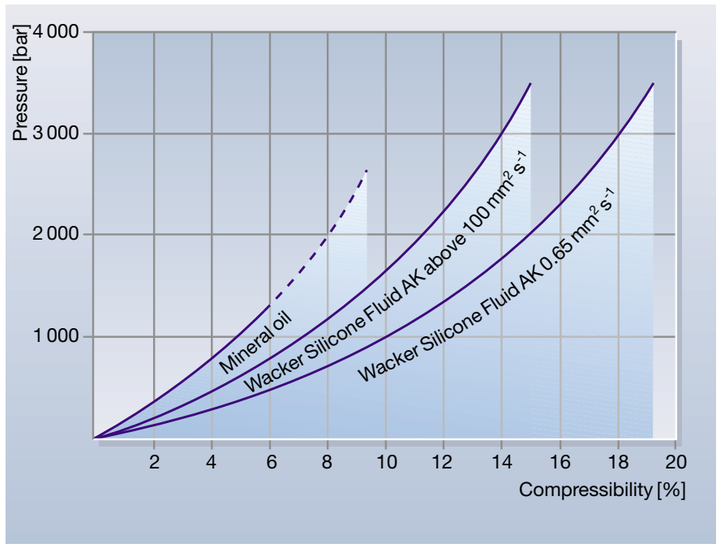
$$r\ (T) = r\ (25\ °C) / [1 + a\,(T–25) + b\,(T–25)^2]$$

$r\ (25\ °C) = 0.97\ g/cm^3$;
$a = 9.2 \times 10^{-4}/°C$; $b = 4.5 \times 10^{-7}/°C^2$

This function is plotted in the adjacent diagram.

Dependence on pressure

The density of Wacker Silicone Fluids AK is strongly dependent on pressure. This dependence decreases with increase in viscosity. The adiabatic compressibility of oils with viscosity ≥ 100 $mm^2 s^{-1}$ is $100 \times 10^{-11}\ m^2 N^{-1}$ at 25 °C. It rises in line with the temperature. Since Wacker Silicone Fluids AK have much higher compressibility than mineral oils, they are used as damping media, eg, in shock absorbers.



Pour points

Wacker Silicone Fluids AK are noted for their exceptionally low pour points. These increase to –40 °C with increasing viscosity of the silicone fluid (see p. 7).
Their tendency to supercool should be borne in mind during low-temperature use. Slow cooling, eg, ≤ 0.2 °C min^{-1}, induces crystallization. The melting points of the fluids are higher than the pour points (see adjacent table).
If the fluids are kept for a long time at a temperature between the pour point and the melting point, spontaneous crystallization may occur.
Fluids with a viscosity of ≥ 100 $mm^2 s^{-1}$, when cooled rapidly, solidify in an amorphous state at a temperature of –122 °C (the glass transition temperature).

Thermal conductivity

The thermal conductivity of Wacker Silicone Fluids AK is only slightly affected by temperature. From grades AK 350 upward it is practically constant, being approximately 0.15 W $K^{-1}\ m^{-1}$ at 50 °C. The lower viscosity fluids have lower values. Wacker Silicone Fluid AK 0.65 for example, has a thermal conductivity of around 0.10 W $K^{-1}\ m^{-1}$ (see p. 6).

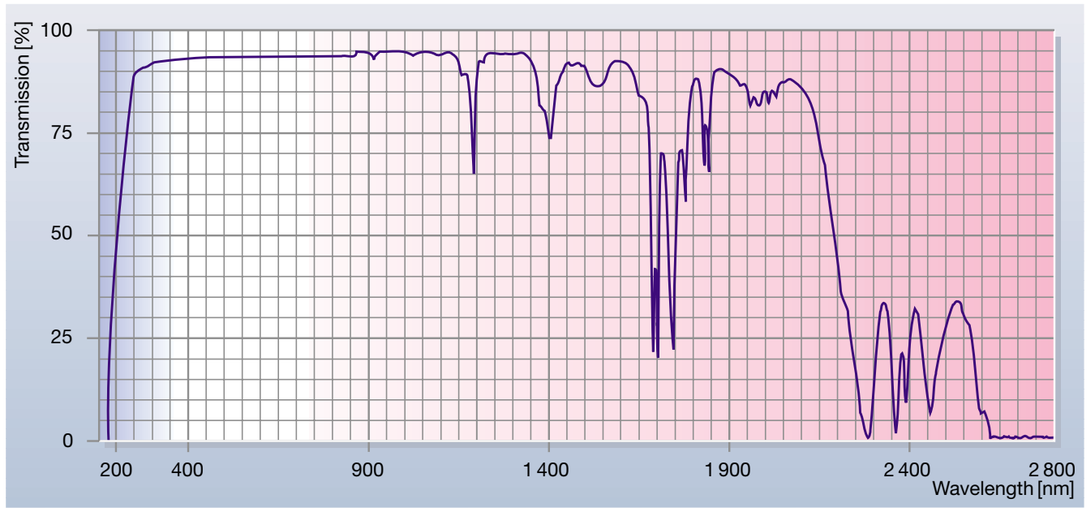
Specific heat capacity

The specific heat capacity of Wacker Silicone Fluids AK shows a slight dependence on viscosity in the low viscosity range. Wacker Silicone Fluids AK ≥ 50 $mm^2 s^{-1}$ have a specific heat capacity of about 1.55 J $g^{-1} K^{-1}$. This value increases slightly with rising temperature.

Wacker Silicone Fluid AK	35	50	100	1 000
Pour point [°C]	< –60	–55	–55	–50
Melting point [°C]	–44	–40	–38	–38

Refractive index and light absorption

The refractive index of Wacker Silicone Fluids AK increases with increasing viscosity, attaining a maximum value of 1.404 at 25 °C at a viscosity of around 1 000 $mm^2 s^{-1}$ (see p. 7). As the temperature rises, the refractive index decreases. The temperature gradient is – 0.00038/°C and is unaffected by viscosity.
All Wacker Silicone Fluids AK have much the same light absorption. In the visible range (400 – 760 nm) thin layers have almost 100 % transmission. In the UV range below 200 nm, the fluids do not transmit light. The UV-vis-NIR transmission spectrum for AK 100 over a path length of 2 mm is shown below.



Heat resistance

Wacker Silicone Fluids AK are more heat resistant than mineral oils. The grades from 35 $mm^2 s^{-1}$ upwards show excellent long-term resistance to temperatures up to 150 °C in the presence of air. At temperatures above 150 °C, their viscosity changes due to oxidation. In closed systems, where the silicone fluids are not in contact with the atmosphere, or in an inert atmosphere (eg, nitrogen, carbon dioxide and rare gases) they will withstand longer exposure up to 200 °C. Within these permissible temperatures the properties of silicone fluids are largely maintained and there is neither decomposition nor discolouration.

Volatility

Wacker Silicone Fluids AK are practically non-volatile at room temperature, except AK 0.65, and their volatility is very low even at high temperatures. Volatility decreases further with increasing viscosity of the silicone fluid (see p. 7).

Flash points

The flash points of Wacker Silicone Fluid AK grades above 100 $mm^2 s^{-1}$ lie above 300 °C. As their viscosities decrease, so do their flash points. For Wacker Silicone Fluid AK 0.65 it is –1 °C (see p. 7).

Self-ignition temperature

The self-ignition temperature increases with rising viscosity. For silicone fluids from 100 $mm^2 s^{-1}$ upwards it remains almost constant at around 500 °C.

Calorific value

The calorific value of Wacker Silicone Fluid AK 350 is 23.24 kJ g^{-1} according to DIN 51 900. This figure can be regarded as applicable to all the silicone fluids in the AK range.

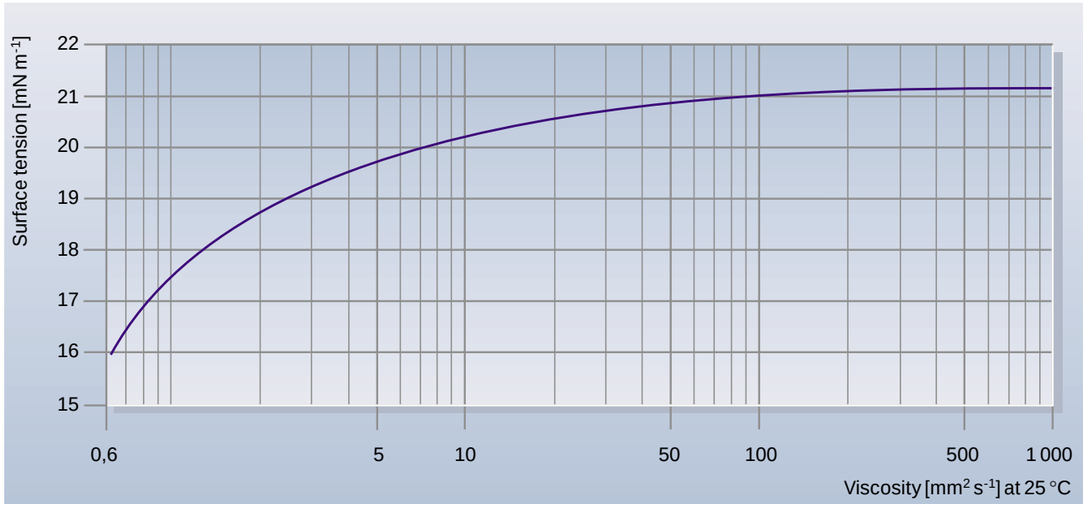
Radiation resistance

The radiation resistance of Wacker Silicone Fluids AK depends on their viscosity and the radiation dose. The change in the initial viscosity resulting from various radiation doses is shown below, using ^{60}Co g - radiation as an example.

Wacker Silicone Fluid	Initial viscosity [$mm^2 s^{-1}$]	Radiation dose [Mrad]				
		5	10	20	40	60
AK 50	53	54	59	69	98	230
AK 350	351	398	627	gels		
AK 1 000	1 000	1 525	5 973	gels		

Surface tension

One of the characteristics of Wacker Silicone Fluids AK is low surface tension. For the higher viscosity grades it is around 21 mN m^{-1} and it is usually lower than that of organic solvents. A low surface tension is equivalent to high surface activity.



Electrical properties

All Wacker Silicone Fluids have remarkably good electrical insulating properties that remain practically unchanged over a wide range of frequencies. These properties, combined with good temperature/viscosity characteristics, heat resistance and water repellency, make these silicone fluids particularly useful as liquid dielectrics.

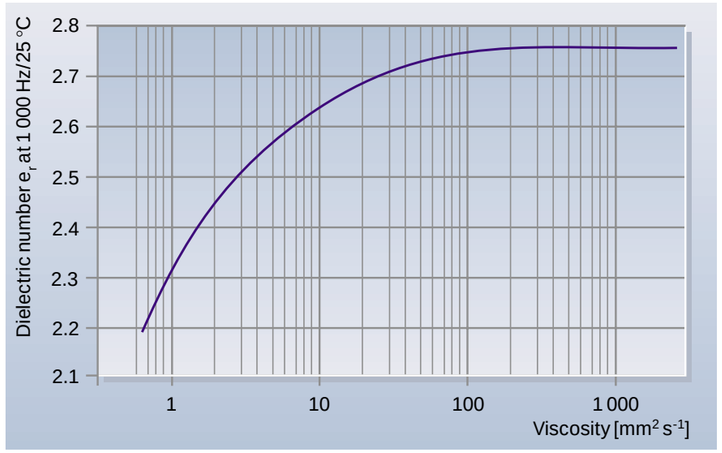
Their dielectric strength, determined in accordance with VDE 0370, is > 30 kV/2.5 mm at 23 °C. It decreases with rising temperature.

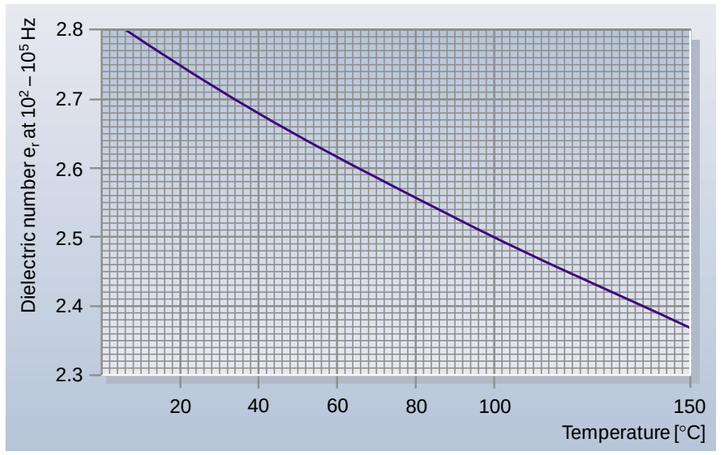
Their volume resistivity, determined in accordance with VDE 0303, is > 10^{14} Ω cm at 25 °C. It decreases with rising temperature.

The dielectric number, determined in accordance with VDE 0303, increases with increasing silicone fluid viscosity, reaching a maximum value of 2.75 at 25 °C at a viscosity of around 300 $mm^2 s^{-1}$. The dielectric number decreases with rising temperature (see adjacent diagrams).

The dissipation factor, tan d, determined in accordance with VDE 0303, is < 10 x 10^{-4} and remains constant over a wide range of temperatures and frequencies.

The electrical properties are influenced by the moisture content of the silicone fluids (< 200 ppm). Dielectric strength and volume resistivity decrease with increasing moisture content, whereas the dielectric number and dissipation factor increase.



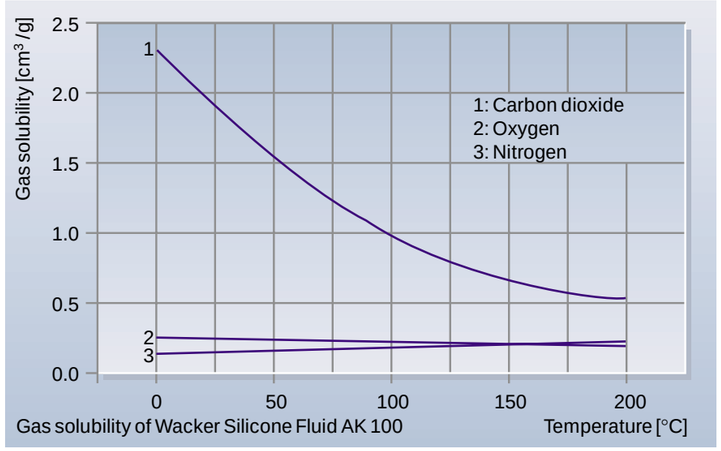


Solubility

Wacker Silicone Fluids AK are non-polar in character and show the typical solubility characteristics of non-polar substances. Solubility changes slightly with viscosity. The low viscosity silicone fluids, up to 20 $mm^2 s^{-1}$ for example, will dissolve in any proportion in dioxane, butanol and isopropyl alcohol, whereas the higher viscosity grades are only partially soluble in these solvents. The presence of water in the solvents markedly reduces the solubility of silicone fluids. Wacker Silicone Fluids AK are largely miscible with Wacker Silicone Fluids AS, but not with Wacker Silicone Fluids AR, AP and CR.

Gases are highly soluble in Wacker Silicone Fluids AK. For fluids ≥ 100 $mm^2 s^{-1}$, gas solubility is independent of the viscosity. The adjacent diagram shows the slight temperature dependence of the solubility of oxygen and nitrogen and the extremely high and pronounced temperature-dependent solubility of carbon dioxide in Wacker Silicone Fluid AK 100.

Solvents in which Wacker Silicone Fluids AK are soluble in all proportions:	
Aliphatic and aromatic hydrocarbons	Ethers
Chlorohydrocarbons	Esters
Higher alcohols from C_5 on	Ketones



Gas solubility of Wacker Silicone Fluid AK 100

Water-repellent properties

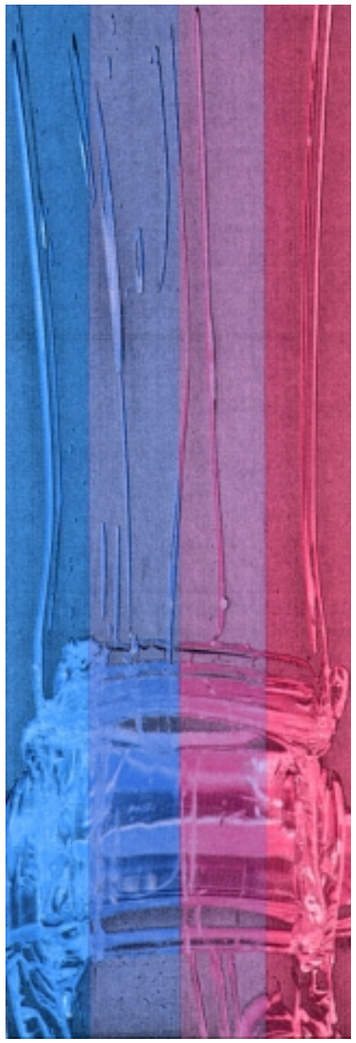
All Wacker Silicone Fluids AK are insoluble in and unaffected by water. A measure of their water-repellent properties is what is known as the contact angle, which is determined on a droplet of water resting on a pre-treated glass plate. It has been found that treating the glass with Wacker Silicone Fluid AK 500 results in about the same contact angle as treating it with paraffin, generally regarded as the most water-repellent of all liquids. Paraffin produces a contact angle of about 105°, silicone fluids between 90° and 110°. Droplets of water placed on a clean metal surface have a relatively small contact angle, which can be greatly increased by treating the surface with, for example, silicone fluid. The following table shows that treatment with Wacker Silicone Fluid AK 500 achieves the same improvement as treating the surface with paraffin. Pure silicone fluids are normally used to achieve water repellency only where high curing temperatures are possible, eg, in the treatment of glass ampoules. Wacker has developed a wide range of silicone impregnating agents to meet the requirements of many different industries. These are described in separate brochures.

Contact angle [°C]	Copper	Brass	Steel
Untreated surface	78 °	82 °	50 °
Paraffin coated surface	103 °	107 °	105 °
AK 500 coated surface	104 °	100 °	108 °

Dyestuffs

Wacker Silicone Fluids AK may be coloured with fat-soluble dyes such as

Spritblau (blue), made by Hoechst AG
Sudanblau II (blue), made by BASF
Sudanviolett BRN (violet), made by BASF
Fettrot B (red), made by Hoechst AG
Ciba-Rot (red), made by Ciba.



Surface slip

Certain properties of Wacker Silicone Fluids AK make them ideal for use as lubricants. These include low pour points, high flash points, excellent heat resistance and compressive strength, as well as relatively constant viscosities under conditions of fluctuating temperatures.

Despite these considerable advantages over organic substances, Wacker Silicone Fluids AK cannot be regarded as general-purpose lubricants. They can be recommended only in certain cases, eg, when they are used as hydraulic fluids or heat transfer media, where lubricating properties are of secondary importance.

In sliding friction between ferrous metal surfaces, they have only very limited load-bearing capacity. In sliding and, especially, rolling friction between ferrous and other metals, the load-bearing capacity and lubricating properties are somewhat better.

Wacker Silicone Fluids AK are especially useful for bearings and gears made of reinforced and unreinforced plastics. They have also proved satisfactory as lubricants for natural and synthetic rubber, PVC, polystyrene as well as for sewing thread. AK 10 to AK 35 are used for very low bearing temperatures, AK 100 to AK 500 being used for temperatures up to 180 °C. In most cases, however, it is preferable to use silicone fluids and silicone greases which have been specially developed as lubricants, in preference to Wacker Silicone Fluids AK, since their properties make them more suitable for this purpose. They are described in our brochure "Wacker Silicone Lubricants".

Physiological properties

Wacker Silicone Fluids AK are pure polydimethylsiloxanes. In animal tests involving dermal, inhalational or oral exposure, these products did not exhibit acute toxic effects, nor were harmful effects observed in studies on subchronic oral toxicity (90 days) conducted in cooperation with other silicone manufacturers. Numerous genotoxicity studies, which are also described in the literature, make no reference to any mutagenic potential. Skin irritation and sensitization trials showed good skin compatibility in tests on both animals and humans (human insult repeat patch test). In animal tests, only upon direct contact with the eye of a rabbit was a slight, temporary irritation of the conjunctiva observed. Special classification, as defined by the EU directive, is not, however, mandatory.

According to the German Food Regulations there is no objection to the use of Wacker Silicone Fluids AK with viscosities of $\geq 100\ mm^2\ s^{-1}$ for the production of consumer goods for food contact applications. Appropriate viscosities are also allowed under certain FDA regulations.

Please contact Wacker-Chemie for detailed information.

For external cosmetic applications there is no restriction with regard to the viscosity of the Wacker Silicone Fluid AK.

All figures are intended as a guide and should not be used in preparing specifications.

Applications of Wacker Silicone Fluids AK

Used as	Properties	Applications
Release agents	Resistant to high and low temperatures, do not form residues on mould surfaces, one application sufficient for many moulding operations; prevent thermoplastic materials from sticking to mould surfaces	Demoulding of rubber and plastics parts, eg, in tyre manufacture and in the moulding of polyamide, cellulose acetate, polystyrene and PVC; packaging industry
Lubricants	Impart excellent slip to plastics and rubber as well as water repellency; reduce surface friction	Plastics bearings, films, cutting tools, mouldings and extrusions, sewing threads
Damping media	Physical properties are practically unchanged at temperatures above 200 °C	Speed regulators, fluid clutches (eg, for fans), nautical and aeronautical instruments, gyrocompasses, shock-absorbing struts, recording instruments, time regulators, pneumatic valves, overload relays, sound pickups
Hydraulic fluids	Excellent viscosity/temperature characteristics, high compressibility and stability under shear	Shock absorbers, pumps, brake cylinders
Liquid dielectrics	Electrical properties remain practically unchanged at high and low temperatures and over a wide range of frequencies; radiation-resistant	Coolants (eg, for magnetrons and other heat-emitting units), transformers, capacitors, high-voltage tubes, aerospace applications (air is no longer effective as coolant at high altitudes)
Water repellents	Low surface tension, strongly water repellent, no nutrient for bacteria and fungi	Glass, ceramics, laminates; switches, insulators; textiles
Antifoam agents	Effective even in very small amounts, odourless and tasteless	Preventing foaming in non-aqueous systems such as mineral and vegetable oils
Cosmetic and dermatological preparations	Non-irritating, non-sensitizing; they form a water repellent protective film which allows the skin to breathe and does not irritate it.	Skin-care creams, sun creams, hair-care preparations, insect repellents
Creams and polishes	Gloss-retaining, water-repellent, impart a silky feel	Car and furniture polishes, shoe creams and floor polishes

Products for Special Applications

For special applications, we refer you to the following Wacker Fluid AK-related products, which have special property profiles. Please request the data sheets you require.

Wacker product name	Special properties	kinematic viscosity [$mm^2 s^{-1}$], 75°C	Application areas
Silicone Fluids AKF	Extremely low volatility	100/300/1000/10000	Release agent for, eg, photocopiers, laser printers
Silicone Fluid TR 50	Low volatility, very good electrical properties	50	Transformer fluids
SILFAR®	Low volatility, high purity	350/500/1000	Pharmaceutical applications
Wacker-Belsil®DM	geringe Flüchtigkeiten, hohe Reinheit	0,65/5/10/20/50/100/ 350/500/1000/12500/ 60000/300000/ 500000/1000000	Cosmetic applications
Silicone Fluids AKC	Particularly heat stable	2000/4000/5000/6000/ 125000/30000/50000	Fan clutches, heat transfer
Silicone Fluids AK ...stab	Increased fatigue resistance in contact with metals	60000/100000/ 150000/200000/ 300000/500000/ 600000	Fluid clutches, damping media

Application area personal care:
Wacker-Belsil® DM fluids

Dimethicons are widely utilized in all aspects of personal-care product formulation. They are recognized as skin protectant drugs providing a highly gas-permeable barrier on the skin, allowing it to “breath”. Dimethicones are utilized in skin-care formulations to improve spreading, reduce whitening or soaping during rubbing in, impart softness and provide a breathable, protective barrier on the skin. In hair-care products, dimethicones reduce combing forces. They also improve the feel of dry hair and reduce “fly-away” as well as imparting humidity resistance and apparent lustre. In sun care and colour cosmetic formulations, dimethicone fluids with low molecular weight improve speadability and skin feel, while high molecular weight fluids and gums impart a water-resistant barrier.

Wacker-Chemie

Wacker-Chemie is a globally active company with headquarters in Munich.

Our four divisions – Semiconductors, Polymers, Silicones and Materials – produce and sell the following products around the world: hyperpure silicon for semiconductor devices, vinyl acetate polymers, base materials, catalysts and specialty chemicals, silicones, silanes and fumed silicas, silicon carbide, advanced ceramics, boron compounds, surface treatments and microporous insulation material. 17,600 employees generate annual sales of over 3 billion euros. Roughly one third of this is accounted for by silicones: materials so versatile that they have an extremely wide range of applications and have secured Wacker-Chemie a leading position in the market for more than 50 years.

Our success is founded on our ongoing commitment to high quality, which pervades all aspects of our business thinking and practices.

For us, quality starts with painstaking research at the highest level, continues into perfecting production processes, products and test procedures and culminates in our commitment to environmental protection and to ISO 14001.

With production facilities in Germany, USA, Brazil, Japan, Singapore, India, France, Italy, Spain and the Netherlands, and through subsidiaries in almost one hundred countries on all continents, we have established a global network that allows us to respond swiftly and flexibly to the demands of the market and thus to the specific needs of our customers. As a result, our products and customized technical services are in great demand.

Customer proximity is extremely important to us. But even more crucial are long-term partnerships based on mutual trust and respect – a strong tradition at Wacker-Chemie.

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