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</tbody>
</table>
Baysilone® Fluids M are a group of liquid, water-clear polydimethyl siloxanes. They differ from organic compounds in both their physical and chemical properties, which, singly or in combination, have won Baysilone Fluids a special place in technological applications. These properties are:

- High and low-temperature stability
- A low pour point
- Minimum effect of temperature and pressure on viscosity
- Low vapour pressure
- Favourable dielectric characteristics little influenced by temperature and frequency
- High interfacial tension to water and organic polymers
- High surface activity
- High compressibility
- Chemical and physiological inertness
- As a result of these properties, Baysilone Fluids M are eminently suitable for use as
  - Heat transfer media
  - Hydraulic fluids
  - Liquid dielectrics
  - Water repellents
  - Polishes
  - Mould release agents
  - Lubricants
  - Antifoams
  - Damping fluids
  - Auxiliaries for the manufacture of cosmetics and pharmaceuticals

The range of Baysilone Fluids M comprises various grades which differ in their viscosity and in related properties. The adjacent list constitutes a survey of the entire range of Baysilone Fluids M.

In addition to the grades listed here, Baysilone Fluids are available, if required, in other viscosities, provided that large or regular supplies are involved. Low-viscosity Baysilone Fluids M are available down to a minimum viscosity of 0.7 mm² · s⁻¹ (cSt). Please ask for further information in individual cases.

### Viscosity: The effect of temperature

<table>
<thead>
<tr>
<th>Baysilone® Fluid M</th>
<th>Viscosity in mm² · s⁻¹ (cSt) at</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-80°C</td>
</tr>
<tr>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>5</td>
<td>132</td>
</tr>
<tr>
<td>10</td>
<td>120</td>
</tr>
<tr>
<td>20</td>
<td>270</td>
</tr>
<tr>
<td>50</td>
<td>150</td>
</tr>
<tr>
<td>100</td>
<td>290</td>
</tr>
<tr>
<td>350</td>
<td>1000</td>
</tr>
<tr>
<td>500</td>
<td>1300</td>
</tr>
<tr>
<td>1000</td>
<td>2900</td>
</tr>
<tr>
<td>5000</td>
<td>8500</td>
</tr>
<tr>
<td>12500</td>
<td>20000</td>
</tr>
<tr>
<td>30000</td>
<td>50000</td>
</tr>
<tr>
<td>60000</td>
<td>100000</td>
</tr>
<tr>
<td>100000</td>
<td>180000</td>
</tr>
<tr>
<td>300000</td>
<td>500000</td>
</tr>
<tr>
<td>1000000</td>
<td>2000000</td>
</tr>
</tbody>
</table>

### The effect of pressure

The viscosity of Baysilone Fluids M, unlike that of mineral oils, is scarcely affected by pressure. A pressure of 2,000 bar at 25°C causes the viscosity of mineral oil to increase 50 to 5,000 times, depending on the grade, whereas the viscosity of Baysilone Fluid M 1000, for example, increases only 14 times under the same conditions. Even when subjected to extreme pressures, at which mineral oils solidify, Baysilone Fluids M remain liquid.

![Graph showing viscosity at different temperatures and pressures](image.png)

Fig. 3 (p. 16) shows the viscosity of Baysilone Fluid M 100 and M 1000 in graph form at different temperatures as a function of pressure.

### Shear behaviour

Baysilone Fluids M act as Newtonian fluids at viscosities below 1000 mm² · s⁻¹ up to a shear rate of over 5 · 10⁸ s⁻¹. At higher viscosities the pseudoplasticity is noticeable even at low shear rates. If the temperature of a fluid is increased, the range of Newtonian behaviour shifts to higher shear rates.

![Graph showing shear behaviour](image.png)

Fig. 4 (p. 17) shows the viscosity of Baysilone Fluids M as a function of the shear rate.
* = dielectric cooling agent for transformers; see "Baysilone 50 EL" brochure.

The volatility of Baysilone Fluids M is restricted, e.g. by reducing the access to air or by sealing off the fluid. The thermal conductivity of Baysilone Fluids is not affected by temperature. Even the level of viscosity has only a slight effect. Thus, although the coefficient of thermal conductivity λ increases somewhat from the low to the medium-viscosity oils, it undergoes no further change when the high-viscosity grades are reached.

The following values for the coefficient of thermal conductivity λ were determined at both 25°C and 250°C:

<table>
<thead>
<tr>
<th>Baysilone® Fluid M</th>
<th>λ - W·K⁻¹·m⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.105</td>
</tr>
<tr>
<td>5</td>
<td>0.116</td>
</tr>
<tr>
<td>10</td>
<td>0.140</td>
</tr>
<tr>
<td>20</td>
<td>0.140</td>
</tr>
<tr>
<td>100</td>
<td>0.174</td>
</tr>
<tr>
<td>1250</td>
<td>0.174</td>
</tr>
<tr>
<td>1000</td>
<td>0.174</td>
</tr>
<tr>
<td>100 000</td>
<td>0.174</td>
</tr>
</tbody>
</table>

Vapour pressure

The vapour pressure of medium and high-viscosity Baysilone Fluids M is very low. At temperatures between 25°C and 175°C, it is between 10⁻⁶ and 10⁻⁸ mbar. Only the low-viscosity grades possess a noticeably higher vapour pressure. The flash point can be taken as an indication of this.

In order to determine the volatile constituents of Baysilone Fluids M at 250°C, the Noack Test (heating a 65 g sample for one hour at atmospheric pressure reduced by 20 mbar and at 250°C) was used. The weight losses which occurred were as follows:

<table>
<thead>
<tr>
<th>Baysilone Fluid M</th>
<th>Noack Test for Baysilone® Fluids M at 250°C (as per DIN 51191)</th>
<th>Weight loss %</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>approx. 50</td>
<td>less than 5.0</td>
</tr>
<tr>
<td>5</td>
<td>approx. 100</td>
<td>less than 3.0</td>
</tr>
<tr>
<td>10</td>
<td>approx. 170</td>
<td>less than 1.0</td>
</tr>
<tr>
<td>20</td>
<td>approx. 240</td>
<td>less than 1.0</td>
</tr>
<tr>
<td>50</td>
<td>approx. 280</td>
<td>less than 1.0</td>
</tr>
<tr>
<td>60</td>
<td>approx. 300</td>
<td>less than 1.0</td>
</tr>
<tr>
<td>100</td>
<td>approx. 300</td>
<td>less than 1.0</td>
</tr>
<tr>
<td>150</td>
<td>approx. 350</td>
<td>less than 1.0</td>
</tr>
<tr>
<td>200</td>
<td>approx. 350</td>
<td>less than 1.0</td>
</tr>
</tbody>
</table>

Thermal stability

In the presence of air, Baysilone Fluids M have practically unlimited stability at temperatures of up to 150°C. The fluids will also stand up well to higher temperatures if the access of air is restricted, e.g. by reducing the exposed surface of the fluid or by sealing off the fluid completely using a narrow pressure-equalising connection pipe. Where air is totally excluded by using the fluids in completely enclosed systems or in an inert atmosphere, e.g. under a nitrogen or carbon dioxide cushion, the fluids may even be exposed to temperature peaks of approx. 300°C.

The densities of Baysilone Fluids M at 25°C are between 0.90 and 0.97. In other words, they do not greatly differ from that of water. The density of the fluids increases with viscosity. The effect of temperature on density is approximately linear. Measurement of the density between -40°C and 175°C produced the figures shown in the table above.

<table>
<thead>
<tr>
<th>Baysilone® Fluid M</th>
<th>Density in g·cm⁻³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40°C</td>
</tr>
<tr>
<td>3</td>
<td>0.97</td>
</tr>
<tr>
<td>5</td>
<td>0.99</td>
</tr>
<tr>
<td>10</td>
<td>1.02</td>
</tr>
<tr>
<td>20</td>
<td>1.02</td>
</tr>
<tr>
<td>50</td>
<td>1.03</td>
</tr>
<tr>
<td>100</td>
<td>1.04</td>
</tr>
<tr>
<td>350</td>
<td>1.04</td>
</tr>
<tr>
<td>500</td>
<td>1.04</td>
</tr>
<tr>
<td>1000</td>
<td>1.04</td>
</tr>
<tr>
<td>10000</td>
<td>1.04</td>
</tr>
</tbody>
</table>

Density

<table>
<thead>
<tr>
<th>Baysilone® Fluid M</th>
<th>Density in g·cm⁻³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40°C</td>
</tr>
<tr>
<td>3</td>
<td>0.97</td>
</tr>
<tr>
<td>5</td>
<td>0.99</td>
</tr>
<tr>
<td>10</td>
<td>1.02</td>
</tr>
<tr>
<td>20</td>
<td>1.02</td>
</tr>
<tr>
<td>50</td>
<td>1.03</td>
</tr>
<tr>
<td>100</td>
<td>1.04</td>
</tr>
<tr>
<td>350</td>
<td>1.04</td>
</tr>
<tr>
<td>500</td>
<td>1.04</td>
</tr>
<tr>
<td>1000</td>
<td>1.04</td>
</tr>
<tr>
<td>10000</td>
<td>1.04</td>
</tr>
</tbody>
</table>

Thermal conductivity, thermal capacity, specific heat
When determining the mean specific heat c of Baysilone Fluids M 50 to M 12,500, there were no appreciable differences between the individual fluids; the same holds true for the mean thermal capacity Wg. The relationship between the values obtained is shown in the table below.

### Table: Specific Volume at Various Temperatures

<table>
<thead>
<tr>
<th>Temp. in °C</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Volume (Vt)</td>
<td>1.51</td>
<td>1.51</td>
<td>1.55</td>
<td>1.55</td>
<td>1.55</td>
<td>1.59</td>
<td>1.59</td>
<td>1.63</td>
<td>1.67</td>
<td>1.73</td>
</tr>
</tbody>
</table>

The specific volume Vspec. (t) of Baysilone Fluids M decreases by 15% under a pressure of 3,500 bar, and by about 30% under a pressure of 25,000 bar. The low-viscosity fluids have even higher compressibility. As can be seen from the values given below, the compressibility is relatively high; Baysilone Fluids M are therefore suitable for use in fluid spring systems.

### Table: Mean Cubic Compressibility Kad

<table>
<thead>
<tr>
<th>Baysilone Fluid M</th>
<th>50</th>
<th>100</th>
<th>350</th>
<th>500</th>
<th>1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Cubic Compressibility Kad in m²/N·s² measured at 25°C</td>
<td>101.6</td>
<td>100.8</td>
<td>100.0</td>
<td>99.8</td>
<td>99.8</td>
</tr>
</tbody>
</table>

### Compressibility

The mean cubic expansion coefficient γ of Baysilone Fluids M in the range 25°C to 175°C is between 99 and 111 x 10⁻⁶ K⁻¹. The differences are slight among the individual types of fluids; a slight increase in the coefficients of expansion is only observed towards the lower viscosities. The volume Vt, taken up by a given quantity of fluid m at a temperature t, can be calculated by means of the equation

\[ V_t = m \cdot V_{spec}(t). \]

### Coefficient of expansion

Specific volume

### Table: Coefficient of Expansion

<table>
<thead>
<tr>
<th>Baysilone Fluid M</th>
<th>3</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>50</th>
<th>100</th>
<th>350</th>
<th>500</th>
<th>1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Cubic Expansion Coefficient 10⁻⁶ K⁻¹ ≤</td>
<td>1.03</td>
<td>1.01</td>
<td>0.98</td>
<td>0.98</td>
<td>0.97</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Specific Volume in cm³/g at</td>
<td>1.11</td>
<td>1.14</td>
<td>1.09</td>
<td>1.08</td>
<td>1.06</td>
<td>1.10</td>
<td>1.05</td>
<td>1.05</td>
<td>1.05</td>
</tr>
</tbody>
</table>

### Compressibility

The specific volume Vspec. (t) of Baysilone Fluids M is given below for certain temperatures. Fig. 5 (p. 18) shows the volume of Baysilone Fluids M as a function of temperature.

### Surface tension

The surface tension of Baysilone Fluids M is about 19–21 mN/m, and is thus extremely low. It shows a very slight increase from the low-viscosity to the high-viscosity fluids.

### Refractive index

The refractive index of Baysilone Fluids M rises from nD25 = 1.3941 for M 3 through 1.4000 for M 1000 and decreases by about 19% under a pressure of 3,500 bar, and by about 30% under a pressure of 25,000 bar. The low-viscosity fluids have even higher compressibility. As can be seen from the values given below, the compressibility is relatively high; Baysilone Fluids M are therefore suitable for use in fluid spring systems.

### Dielectric performance

Because of their satisfactory dielectric characteristics, Baysilone Fluids M are useful dielectrics. Measurements have revealed that the dielectric strength, volume resistivity, dielectric constant and dissipation factor are little affected by temperatures over a wide range. Similarly, there is very little change in the dielectric constant and the dissipation factor over a frequency range from 10¹ to 10⁶ Hertz. The relevant data for Baysilone Fluid M 350 can be seen in Figs. 6 and 7 (p. 19 and p. 20). The dielectric characteristics of other Baysilone Fluids M are listed in the following table and are also contained in the "Baysilone M 50 EL" brochure.

### Solubility

Satisfactory solvents for all Baysilone Fluids M are aliphatic and aromatic hydrocarbons, higher alcohols, ethers, esters and chlorinated hydrocarbons, e.g.

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Petroleum spirit</th>
<th>Ethyl acetate</th>
<th>Benzene</th>
<th>Butyl acetate</th>
<th>Toluene</th>
<th>Carbon tetrachloride</th>
<th>Ether</th>
<th>Chloroform</th>
<th>Butyl alcohol</th>
<th>Trichloroethylene</th>
<th>Amyl alcohol</th>
<th>Acetylene tetrachloride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocarbons</td>
<td>Petroleum spirit</td>
<td>Ethyl acetate</td>
<td>Benzene</td>
<td>Butyl acetate</td>
<td>Toluene</td>
<td>Carbon tetrachloride</td>
<td>Ether</td>
<td>Chloroform</td>
<td>Butyl alcohol</td>
<td>Trichloroethylene</td>
<td>Amyl alcohol</td>
<td>Acetylene tetrachloride</td>
</tr>
</tbody>
</table>
Baysilone Fluids are insoluble in water, methanol and ethylene glycol. Their solubility in organic solvents increases as their viscosity decreases. Baysilone Fluids M 50 and M 100 are thus also soluble in isopropanol and nbutanol and have limited miscibility with npropanol. Baysilone Fluids M with viscosities of less than 20 mm²·s⁻¹ are soluble in acetone and dioxane. Baysilone Fluids M with viscosities down to 10 mm²·s⁻¹ are also soluble in ethanol.

### The solubility of gases in Baysilone Fluids M

Gases have a relatively high solubility in Baysilone Fluids M, and this is scarcely affected by temperature. The differences in solubility between the individual Baysilone Fluids M are also relatively small. At room temperature and normal atmospheric pressure, the following quantities of gas are soluble in 1 gram of fluid:

- **Air**: approx. 0.190 cm³
- **Nitrogen**: approx. 0.170 cm³
- **Carbon dioxide**: approx. 0.001 cm³

The solubility of gases in Baysilone Fluids M is less than 0.01. Thus 1 g fluid requires less than 0.01 mg potassium hydroxide in order to neutralise the acid constituents.

### Lubricating and slip properties

The following information on the lubricating properties of Baysilone Fluids M is intended primarily to serve as a reference for applications where Baysilone Fluids M are to be used as hydraulic fluids, heat transfer media and the like, and where their lubricating properties are valuable extra assets.

The lubricating properties of Baysilone Fluids M depend to a large extent on the particular bearing materials used. The best results are obtained with plastics, e.g. polyamides, polystyrene and phenolic resins, as well as with rubber. Baysilone Fluids M are also suitable as lubricants for certain combinations of metals, e.g. steel with bronze, brass, chrome and zinc, and chrome with bronze.

They have no lubricating properties, however, in the case of steel/steel contact within the range of limit friction. It is therefore necessary to decide in each individual case whether the use of Baysilone Fluids M in a pure form is appropriate where there are lubricating problems.

In cases where Baysilone Fluids M are formulated with additions of thickening components to give greases, the lubricating properties are improved, since a part of the lubricating function is taken over by the additive.

The lubricating properties of the fluids must not be confused with their slip properties. Baysilone Fluids M constitute excellent slip agents in many applications, e.g. in the processing of certain plastics and synthetic fibres. In this function, the effectiveness of Baysilone Fluids M is attributable more to their release action than to the formation of a load-carrying lubricating film.

Baysilone Fluids M are generally inert. They are resistant to water, organic solvents, pure oxygen and many chemicals. Contact with most metals causes no change and the fluids themselves attack neither metals nor wood, paper or plastics. The table below shows how Baysilone Fluids M are affected by a number of materials known for their aggressive nature. It gives the % change in viscosity after 12 hours' exposure at 25°C and 100°C respectively to a variety of acids and alcohols.

<table>
<thead>
<tr>
<th>% change in viscosity after 12 hours</th>
<th>Baysilone® Fluid M 50</th>
<th>Baysilone Fluid M 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>1n sodium hydroxide solution</td>
<td>+ 1.1</td>
<td>+ 0.1</td>
</tr>
<tr>
<td>1n hydrochloric acid</td>
<td>+ 2.2</td>
<td>+ 0.6</td>
</tr>
<tr>
<td>36% hydrochloric acid</td>
<td>+ 28.2</td>
<td>+ 3.05</td>
</tr>
<tr>
<td>13% nitric acid</td>
<td>+ 7.6</td>
<td>+ 4.0</td>
</tr>
<tr>
<td>30% sulphuric acid</td>
<td>–</td>
<td>+ 5.8</td>
</tr>
</tbody>
</table>

### Storage stability

Strong oxidants, such as concentrated nitric acid and elemental chlorine, cause Baysilone Fluids M to deteriorate, especially at elevated temperature. An important point regarding the use of Baysilone Fluids M in electrical applications is that silicon dioxide is formed as the main combustion product when the fluids burn and that this, unlike graphite carbon, is non-conductive.

Climatic changes have no influence on the properties of Baysilone Fluids M. When properly stored, they are stable for many years; they neither precipitate any solids, even after long periods of time, nor undergo any changes in colour or acid value. As a result of their extremely low vapour pressure, their low pour point and their absolute inertness to packaging materials, there are no special requirements with regard to storage vessels and conditions. As with any other oily fluid, contact with water generally results in emulsion turbidity.

Baysilone Fluids M are freely miscible with one another. They are also miscible with the PD 5 and PK 20 grades of the F range of Baysilone Fluids, but not with the PN 200, PN 1000, PH 300 and PH 1000 grades of the same range.

In cases where silicone fluids with a viscosity differing from the grades described here are required, these can easily be obtained by blending. This of course only holds true for those viscosities which are within the range of the Baysilone Fluid grades. The requisite mixing proportions can be seen from the graph (Fig. 1). If, for example, it is desired to obtain a fluid with a viscosity of 6000 mm²·s⁻¹ by blending Baysilone Fluid M 1000 (viscosity 1000 mm²·s⁻¹) and grades M 12500 (viscosity 12500 mm²·s⁻¹) at 25°C, the value 1000 mm²·s⁻¹ should be marked on the left and the value 12,500 mm²·s⁻¹ on the right ordinate, and the two values should be connected by a straight line. The intersection of the connecting line with the abscissa parallel, which is drawn through the ordinate value 6000 mm²·s⁻¹, gives the blending proportions in per cent on the abscissa, namely 70% Baysilone Fluid M 12500 and 30% Baysilone Fluid M 1000.

Physiological behaviour

Baysilone Fluids M are water-clear liquids which have neither odour nor taste. They are non-toxic and pharmacologically inert. This was determined in various tests on the acute and chronic toxicity in animals and has been confirmed by many years of experience with the product. Because of their inertness to the human skin and their ability to form protective films against water and aqueous solutions, polydimethylsiloxanes are valuable raw materials in dermatology and cosmetics. If silicone fluids get into the eye, they may, like any other foreign substance, cause a temporary irritation of the conjunctiva, as a result of the hydrophobic effect of the silicone. This may temporarily reduce eye moisture. However, we do not know of any cases where contact has caused permanent damage.

### Miscellaneous and viscosity adjustment

Special commercial and processing formulations

Baysilone Fluids M are marketed by us in the range of grades listed here. Their wide variety of applications and the widely divergent requirements made by these, however, have induced us to offer the fluids as well as the emulsions, aerosols, release agents etc. made from them in special commercial and processing formulations. For each of these products we publish special instructions for use and processing.

Where special demands are made with respect to heat stability, processability to lubricating greases and solubility for given applications, Baysilone Fluids P, another product in the Baysilone Fluid range, can be used to best advantage. In this connection see the brochure on Baysilone Fluids P (AC 12.023).

Especially for the use as an heat transfer medium in open systems Baysilone Fluids M and P are available in stabilized grades. In respect of demand please contact us.
Baysilone Fluids MPH is Bayer’s proprietary name for polydimethyl siloxanes (PDMS) which are used in the pharmaceutical industry. They are tested according to the relevant monographs in the German Pharmacopoeia (DAB), which corresponds to the European Pharmacopoeia (Ph Eur), and meet the requirements of these monographs.

The number in the product nomenclature refers to viscosity measured in mm²·s⁻¹. It should be taken into account that our PDMS are not manufactured according to GMP (= Good Manufacturing Practice) standards.

Monograph VI.1.3.1 which is entitled “Silicone fluids for use as lubricants” and refers to viscosity measured in mm²·s⁻¹. PDMS are described in two monographs in the German Pharmacopoeia (DAB), and meet the requirements specified by the DAB (Ph Eur). Tests on random samples showed that the germ count in Baysilone Fluids MPH conformed. No pathogenic indicator organisms were detected.

Information on the toxicological and ecotoxicological properties of PDMS is available on request.

**Physiological and toxicological properties**

Human studies have shown that PDMS is not absorbed in the gastrointestinal tract following oral administration and has a laxative action. PDMS is a constituent of some antiflatulence preparations which prevent or resolve intestinal gas.

Information on health and safety and handling information can be found in our safety data sheet.

Baysilone Fluids MPH keep for at least 12 months after delivery.

A standard analytical report contains the results of tests on the following parameters:

- content of substances with an acidic reaction
- viscosity
- content of mineral oils
- content of phenylated compounds
- content of volatiles
- content of heavy metals

Tests on random samples showed that the germ count in Baysilone Fluids MPH conformed. No pathogenic indicator organisms were detected.

Information on the toxicological and ecotoxicological properties of PDMS is available on request.

**Purity requirements and tests**

These grades are all tested to ensure that the requirements specified by the DAB (Ph Eur) and the USP for PDMS are met. An analytical report containing the relevant data can be supplied on request.

**Storage**

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Baysilone Fluids MPH keep for at least 12 months after delivery.
Baysilone Fluid MH 15 is a polymethyl hydro- 
gen siloxane with the following structure:
\[
\begin{array}{c}
\text{CH}_3 \\
\text{CH}_3 - \text{Si} - \text{O} - \text{Si} - \text{Si} - \text{CH}_3 \\
\text{CH}_3
\end{array}
\]
where n has a value of approx. 40.

Properties and reactions

The SiH groups contained in Baysilone Fluid 
MH 15 are susceptible to further chemical 
reactions, so that, in contrast to Baysilone 
Fluids M, Baysilone Fluid MH 15 can react with 
other substances. Thus, for example, the SiH 
bond reacts with water or compounds contain-
ing hydroxyl groups, with hydrogen being split 
off (caution!) as follows:
\[
\text{Si} - \text{H} + \text{H} - \text{O} \rightarrow \text{Si} - \text{O} - \text{Si} - \text{H}_2
\]
This splitting off takes place even on contact 
with water or alcohol, so that the reaction 
described above must be expected in the 
case of aqueous or alcoholic preparations.

If R is a base-forming metal, e.g. sodium, 
calcium or other basic substances such as 
ammonia or amines, then the reaction occurs 
spontaneously.

With regard to further reactions entered into 
by the SiH bond, oxidation (e.g. by heating in 
air), substitution and addition are worthy of 
mention:

Oxidation
\[
2 \text{Si} - \text{H} + 1/2 \text{O}_2 \rightarrow \text{Si} - \text{O} - \text{Si} + \text{H}_2
\]

Substitution
\[
\text{Si} - \text{H} + \text{XR} \rightarrow \text{Si} - \text{R} + \text{HX}
\]
\((\text{X} = \text{halogen for example})\)

Addition
\[
\text{Si} - \text{H} + \text{R}_2\text{C} = \text{CR}_2 \rightarrow \text{Si} - \text{CR}_2 - \text{CR}_2\text{H}
\]

Baysilone Fluid MH 15 is soluble in practically 
any ratio in all normal organic solvents such as 
hydrocarbons, chlorinated hydrocarbons, 
ethers, esters, aromatics and ketones, ethyl 
alcohol (99.5%) and higher alcohols.

Baysilone Fluid MH 15 is not soluble in water, 
methanol or ethanol (in concentrations of 96% 
or less).

Given appropriate storage conditions, Baysilone 
Fluid MH 15 will keep for a long time. In the 
presence of water or aqueous substances 
(emulsions, aqueous solutions, dispersion 
media and filters), the shelf life is limited and 
dependent upon the pH. In the neutral range, 
the effect on storage stability is relatively 
slight. Whereas stability can still be 
achieved in the weakly acid range, decom-
position sets in on exposure to highly acid or 
alkaline reagents. Even trace amounts of al-
kali cause hydrogen to evolve and the fluid to 
gel. The hydroxyl group of alcohols also 
reacts in this way, but to a much lesser 
extent than water.

Use

The uses of Baysilone Fluid MH 15 derive 
from the properties described above. Thanks 
to the reactivity of the SiH groups, Baysilone 
Fluid MH 15 can be admixed with unsaturated 
organic compounds such as polyester and 
methacrylate resins, and is thus able to bring 
about a modification of such products.

The conversion of compounds containing 
hydroxyl groups has also been referred to; 
this is important for the use of Baysilone Fluid 
MH 15 as a water repellent and impregnating 
agent for textiles, paper and leather, since it 
ensures stable siliconisation.

Finally, the above-mentioned oxidisability of 
the SiH bond at elevated temperatures (caused, 
for example, by atmospheric oxygen) is in 
many cases an advantage, for this also means 
that the applied film of silicone oil is more 
firmly anchored to the substrate. Thus, for 
example, Baysilone Fluid MH 15 is used to 
prevent agglomeration and hence to improve 
the free-flowing properties of fine-grain inor-

ganic materials. The loading of previously 
dried fine-grain materials with Baysilone Fluid 
MH 15 is best carried out in a vat or mixer 
which can be heated to between 20 and 60°C. 
About 0.5 to 1.5% Baysilone Fluid MH 15 is 
sprayed into the granules, which are constantly 
stirred until even distribution is achieved. 
The temperature is then raised to 120°C for about 
1 hour.

If elevated temperatures must be avoided for 
any reason (e.g. when treating certain colour 
pigments), then it is advisable to add Silopren 
Adhesive Trial Product AC 3023, an amino-

functional silane, or Silopren Catalyst 162, an 
occlusive metal compound. The catalyst is 
added after Baysilone Fluid MH 15 has 
been thoroughly mixed with the filler. 5 to 10% of 
the amount of Baysilone Fluid MH 15 has 
proved to be an appropriate quantity. On 
no account should both components be mixed 
together first! By adopting this procedure, the 
post-cure process can be dispensed with and 
the reaction time will be reduced to about 
½ hour.

One further possibility is to introduce Baysilone 
Fluid MH 15 into the material in the liquid 
phase. The bulk material, for example glass 
beads, is added to a 0.5–1.5% solution of 
Baysilone Fluid MH 15 in chlorinated hydro-
carbons; this solution is then removed and the 
material is subsequently heated for one hour 
at 220°C. If a catalyst is used, heating can 
be dispensed with, as above.

Baysilone Fluid MH 15 has also proved suitable 
for the water-repellent treatment of gypsum 
plasterboard and solid gypsum sheeting.

Water-repellent treatment of this sort is always 
necessary when such materials are used in 
kitchens, bathrooms, etc. The water-repellent 
treatment is applied in the pulp, i.e. the water-

repellent agents are added directly to the 
other components during production of the 
plasterboard or sheeting.

In the past, aqueous emulsions were 
normally used for this purpose but these 
days pure silicone fluid (DE-PS 3429311) is 
more usual.

Generally speaking, the most economical 
process is water-repellent treatment with 
Baysilone Fluid MH 15 since it is a well-known 
fact that, calculated on the active ingredient 
content, fluids are most cost-effective. 
Consequently, changing to fluid products 
reduces costs. Silicone fluid is also more 
advantageous as far as storage is concerned.

Additions should be 0.2–0.4% fluid calculated 

on gypsum content. An addition of this amount 
of Baysilone Fluid MH 15, for example, reduc-
es the water absorption of plasterboard after 
immersion in water for two hours (dipping test) 
as per DIN 18 180 to less than 10%.

In special cases where somewhat higher vis-

cosity is required when using a polymethyl-
hydrogen silicone, we recommend the use of 
Baysilone Fluid MH 20. The reaction beha-

vior of this product is virtually the same as that 
of Baysilone Fluid MH 15.

Storage stability

Viscosity at 25°C: 15 ± 2 mm² · s⁻¹ (cSt)
Density at 25°C: 0.99
Neutralisation value: max. 0.02
Flash point: > 150°C

Important note

Whenever working with Baysilone Fluid MH 15, 
it should be borne in mind that hydrogen may 
evolve under the reaction conditions which 
apply here (cf. the section on “Properties and 
reactions”). Precautions should therefore be 
taken to ensure that no combustible or explo-
sive gas mixture can form.
Fig. 1: Adjustment of the viscosity by blending

Fig. 2: The effect of temperature on the viscosity of Baysilone Fluids M as compared to mineral oils
Fig. 3: The effect of pressure on the viscosity of Baysilone® Fluids M 100 and M 1000 at 25, 40, 60 and 80°C (according to F. Kuss and G.G. R. Schultze)

Fig. 4: The flow properties of Baysilone® Fluid M at 25°C
Fig. 5: The effect of temperature on the volume of Baysilone Fluids M

Fig. 6: The effect of temperature on the dielectric and electrical characteristics of Baysilone® Fluid M 350
Fig. 7: The effect of frequency on the dielectric constant ($\varepsilon_r$) and the dissipation factor (tan $\delta$) of Baysilone® Fluid M 350