SILRES® REN 80
Silicone Resin Solution

Characteristics

SILRES® REN 80 is a methyl phenyl group containing silicone resin solution that is recommended as a binder for medium solids or high solids heat resistant paints.

Special characteristics

In combination with suitable temperature stable pigments and fillers, SILRES® REN 80 is the optimum binder for heat resistant paints. After paint application, paint drying and paint baking, coatings based on SILRES® REN 80 can withstand temperatures of up to 650°C (1200°F) without losing adhesion.

Some specific properties of SILRES® REN 80 are:

• medium hard coating
• suitable for medium solids and high solids paints
• air-drying
• good compatibility with organic resins (but preferably used as a sole binder)
• excellent hydrophobicity of the final coating

SILRES® REN 80 is the binder of choice for black pigmented paint formulations.

SILRES® REN 80 in silver colored, aluminum pigmented paint formulations enable coatings with outstanding heat resistance.

At temperatures higher than 250°C (480°F) the organic groups start to degrade. After all the organic parts of the silicone resin have been pyrolytically decomposed, the product that remains moves to an inorganic stoichiometric composition of (SiO2)n. It is this layer which firmly binds pigments and fillers to themselves and to the coated substrate.

Applications

Heat resistant coatings must withstand temperatures of between 200°C (400°F) and 600°C (1100°F) or even more without breaking down or separating from the substrate.

Furthermore, such coatings can withstand extreme temperature fluctuations and must provide some corrosion resistance.

One important field where heat resistant coatings are being used in the automotive and aircraft industry, where paints have to meet exceptionally high standards. Here, such coatings are used for exhaust systems, mufflers and parts close to the engine.

Heat resistant coatings are also used in industrial applications, e.g. in coatings for chimneys, furnaces, gas boilers, heat exchangers, light bulbs and the like. Besides heat resistance, extremely good corrosion resistance can be additionally achieved with a zinc rich primer overcoated with a SILRES based heat resistant paint.

Some household appliances and their various parts are subjected to high temperatures as well. Ovens and oven inserts, stoves and barbecues are just some examples where heat resistant coatings are needed.

Processing

The most important operation in making a heat resistant paint according to a given formulation is the dispersion of pigments and fillers. Suitable machines used to achieve homogeneous products include mixer agitators and pearl mills.

<table>
<thead>
<tr>
<th>Properties</th>
<th>Test procedure</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td></td>
<td>clear, colorless to slightly yellow solution</td>
<td></td>
</tr>
<tr>
<td>Solvent</td>
<td></td>
<td>xylene</td>
<td></td>
</tr>
<tr>
<td>Solids content</td>
<td>1 h / 200 °C (392 °F)</td>
<td>[%]</td>
<td>82 ± 2</td>
</tr>
<tr>
<td>Viscosity</td>
<td>DIN 51 562-1</td>
<td>[mm²/s]</td>
<td>approx. 2000</td>
</tr>
<tr>
<td>Density at 25 °C (77 °F)</td>
<td>DIN 51 757</td>
<td>[g/cm³]</td>
<td>1.12</td>
</tr>
<tr>
<td>Flash point</td>
<td>DIN 51 755</td>
<td>[°C]</td>
<td>25 (77 °F)</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>DIN 51 794</td>
<td>[°C]</td>
<td>485 (905 °F)</td>
</tr>
</tbody>
</table>

* These figures are intended as a guide and should not be used in preparing specifications.
Aluminum paints

SILRES® REN 80, pigmented with aluminum pigments, yield highly heat resistant, anticorrosive coatings that adhere well to sandblasted steel and resist temperatures of up to 650°C (1200°F). The coatings should be baked for about 1 hour at 200°C (390°F).

Guide formulations are available on request.

Black pigmented paints

SILRES® REN 80 pigmented with thermo stable black pigments (e.g., iron manganese oxides) yield highly heat-resistant, anticorrosive coatings with a temperature resistance of up to 500°C (930°F). The coatings should be baked for about 1 hour at 200°C (390°F).

Guide formulations are available on request.

Paints with additional colors

Beside silver and black formulations, additional colors are possible as well. For example, colored inorganic spinels, titanium dioxide (Rutile type) enable the formulation of paints with a temperature resistance of up to 400°C (750°F) or 500°C (930°F).

Fillers

Fillers are widely used to make paint formulations more economic. For heat resistant paints, mica and talc are often used.

Platelet-like pigments and fillers can be very helpful to strengthen adhesion as they become aligned parallel to the surface as the paint dries. This does not only support the adhesion of the coating, but also improves the corrosion resistance by the numerous overlapping particles.

Adhesion

To get an optimum adhesion of the heat resistant coating, substrates have to be free from any dirt and rust. Sand-blasting to get a mechanically roughened surface and the complete removal of any oil and grease by suitable solvents is highly recommended.

Furthermore, coating thickness is a crucial condition for good adhesion at higher temperatures. The optimum film thickness is seen between 15 and 25 µm after baking.

Application

Heat resistant paints can be applied by any of the traditional methods such as spraying, dipping and brushing.

Film formation

Physical drying of the paint already begins during application, through evaporation of the solvent.

Heat resistant paints based on SILRES® REN 80 normally dry within 30 to 60 minutes after application.

Heat curing and baking

To get maximum resistance to heat, corrosion and chemicals, a heat resistant paint has to be baked.

In case of SILRES® REN 80, 1 hour at 200°C (390°F) is recommended.

Storage stability

SILRES® REN 80 has shelf life of at least 6 months if stored in tightly closed original containers between 5°C (41°F) and 30°C (86°F). 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 of the properties relevant to the application.