

INDUSTRIAL COATINGS | BINDER FOR POWDER COATINGS |  
 SILRES® 604 AND SILRES® 605

# SILRES® 604 AND SILRES® 605:

## Solid Silicone Resins for Excellent High-Temperature Performance

Powder coatings have a whole range of unique and ecological advantages over conventional liquid paints. Thanks to their resistance to high mechanical loads and thermal stresses, silicone resins used as binders can open up new application areas for powder coatings. Organic binders have a fairly narrow range of service temperatures, but silicone-based powder resins can be exposed to severe frost or temperatures as high as 600 °C and still remain fully functional.

### What Characterizes SILRES® Powder Resins?

As sole binders, both SILRES® products can be combined with suitable fillers and pigments to produce powder coatings whose performance is not significantly affected by temperatures up to around 600 °C.

Furthermore, both products can be used together with organic resins to formulate powder coatings that display considerably enhanced weatherability compared to purely organic binder systems. The combination of SILRES® 604 and SILRES® 605 with organic resins – especially polyester and epoxides – results in powder coatings with long-term thermal stability up to around 250 °C, and short-term even up to 300 °C. In this temperature range, white coatings containing SILRES® powder resins as binders are less likely to yellow than comparable powder coatings without silicone resin. Together, the enhanced properties (resistance to extreme temperatures and

### Typical General Characteristics

	SILRES® 604	SILRES® 605
Supply form	Flakes	Flakes
Silicone content	> 99%	> 99%
Glass transition temperature (Tg)	> 55 °C	> 65 °C
Ph/Me ratio	~ 1	~ 1
OH group content	4.5 – 6.0%	3.0 – 4.5%

weathering, as well as increased thermal stability and reduced surface tension) open up a wide range of applications.

### A Wide Variety of Application Possibilities

As sole binders, SILRES® 604 and SILRES® 605 are ideal as raw materials for highly heat-resistant powder coatings in exhaust systems and cast-iron stoves. Moreover, due to the products' compliance with FDA 17.300 and BfR XV, it is possible to combine them with organic binders for high-temperature applications with food contact, e.g. BBQ grills and coatings for pots and pans with medium temperature tolerance. The latter display excellent gloss retention and alkali resistance even with long-term use.

### More Advantages with SILRES® 604/605

Both products feature a glass transition temperature (Tg) of over 55 °C. They can thus be used to formulate tack-free powder coatings that have a long shelf life at normal temperatures.

### Example: Silicone Powder Coating (Resistant to Corrosion and Heat, Black)

SILRES® 604	190.0 g
Ferrous oxide, black	60.0 g
Mica filler	42.4 g
Anticorrosion pigment	52.8 g
Talc	47.6 g
Benzoin degassing agent	1.2 g
Pyrogenic silica HDK®	1.6 g
Curing time: 30 min. at 130 – 230 °C	

### Coating Properties (Dry Film Thickness ~ 40 – 60 µm, Low Gloss, Smooth Structured)

Thermoplasticity at 200 °C	2H
Pencil hardness after curing at 130 – 230 °C / 30 min.	4H



### Free-Flow Properties

To ensure that such fine-particle powders never lose their free-flow properties, it is advisable to admix a pyrogenic silica, such as WACKER's HDK®. This ensures simple processing and excellent fluidization every time.

During mixing, HDK® is absorbed on the surfaces of the individual powder particles, separating them from one another. The powder can therefore flow freely, ensuring better edge coverage in the melt phase. Hydrophobic HDK® is generally more effective. In hygroscopic powder formulations, there may be advantages to using hydrophilic HDK®. Its ability to absorb moisture generates a drying effect that assists powder flowability.

### Economical in Use

The desired effect can be obtained with an addition of 0.1 to 0.3 wt. percent of HDK®. The advantages of HDK® are effective in each application phase:

- Easier and faster sieving
- Uncomplicated application (spraying, fluidized bed)
- Electrostatic wrap-around is retained
- Film-formation and hardening are not disadvantaged

For more information about product selection and processing, visit [www.wacker.com/hdk](http://www.wacker.com/hdk)

### Example: Silicone-Polyester Powder Coating (Heat Resistant, Full Gloss, Black)

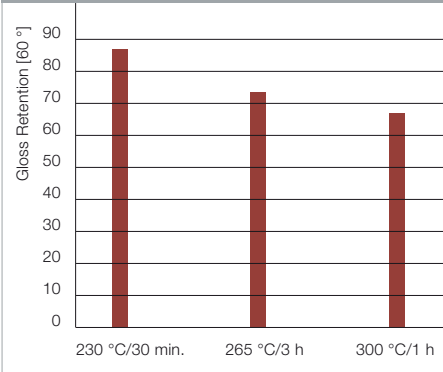
SILRES® 604	547.0 g
IPDI hardener	12.0 g
Polyester resin	100.0 g
PE hardener	5.0 g
Ferrous oxide, black	250.0 g
Filler	66.0 g
Benzoin degassing agent	5.0 g
Pyrogenic silica HDK®	15.0 g
Curing time: 30 min. at 130 – 230 °C	

### Coating Properties (Dry Film Thickness ~ 40 – 60 µm, Full Gloss, Smooth)

Thermoplasticity at 100 °C	HB
Pencil hardness	4H
MEK (after curing at 130 – 230 °C / 30 min.)	> 200 DR



### Gloss Retention after Heat Stress of a Silicone-Polyester Powder Coating



### At a Glance: The Advantages of SILRES® 604/605

- Solvent-free flaked silicone resin
- Hydroxy-functional phenyl-methyl resin
- Provides powder paints with high thermal stability
- Good organic compatibility
- High glass transition temperature, Tg
- Conforms to FDA 21 CFR 175.300 and BfR XV
- Broad end-use application range



Wacker Chemie AG, 81737 München, Germany, Tel. +49 89 6279-1741, Fax +49 89 6279-1770, [info@wacker.com](mailto:info@wacker.com)

The data presented in this information sheet are in accordance with the present state of our knowledge but do not absolve the user from carefully checking all supplies immediately on receipt. We reserve the right to alter product constants within the scope of technical progress or new developments. The recommendations made in this information sheet should be checked by preliminary trials because of conditions during processing over which we have no control, especially where other companies' raw materials are also being used. The information provided by us does not absolve the user from the obligation of investigating the possibility of infringement of third parties' rights and, if necessary, clarifying the position. Recommendations for use do not constitute a warranty, either express or implied, of the fitness or suitability of the product for a particular purpose.