

MERCK



ultimate protection

Polysilazanes – a new class of coating binders for effective surface protection

 durazane™

ultimate protection

A car with a perfect and long-lasting coating. The shiny, bright facade of a skyscraper that resists weathering. An offshore wind park which can withstand extremes of salt, water and UV radiation. **What do these three have in common? They are coated with polysilazanes, which lend them unrivaled and long-lasting protection against all kinds of damage, thus preserving their value.**

What are polysilazanes?

Polysilazanes are an entirely new class of coating binders – an advancement in silicon polymer technology that is proprietary to Merck. Their polymer backbone consists of alternating silicon and nitrogen atoms. Owing to their unique properties, they are the perfect choice for ultimate protection in many high-value applications.

We offer two different polysilazane product groups: **organic polysilazanes** (OPSZ), marketed under the brand name Durazane™, and **inorganic polysilazanes**, also known as perhydropolysilazanes (PHPS), available in our NN, NL, NP and NAX series. Organic polysilazanes are sold as 100% solids, whereas inorganic polysilazanes are supplied as 20% solutions in various solvents.

Unique features of polysilazanes

- Novel class of silicon polymers specifically developed as binders in high-performance solvent-borne coating formulations
- Available as transparent, low-viscosity liquids – curing transforms the products into quartz glass-like silicon dioxide films (PHPS) or ceramic layers (OPSZ)
- Real covalent binding assures very good adhesion to many substrates such as metals, glass, minerals, ceramics, plastics, composites and wood

Benefits of polysilazanes

Incorporate our polysilazane resins to your paint and coating formulations and enjoy the following benefits:

- Very good thermal resistance (up to 1000 °C)
- Strong protection against corrosion and weathering
- Excellent scratch, impact and abrasion resistance
- Good to excellent chemical resistance
- High hardness (up to 5H with OPSZ, up 9H with PHPS – depending on formulation and substrate)
- Strong surface hydrophobicity enables easy-to-clean properties
- Good durability allows long-lasting protection to numerous types of surfaces
- Good compatibility with other organic resins
- Applicable in low to medium film thicknesses

Mobility



Pages 4-5

Main applications include high-temperature exhaust coatings, car beauty treatments and marine coatings.

Architecture

Pages 6-7

Applications include building facade protection and coatings of interior areas such as kitchens.



Industry

Pages 8-9

Industrial coatings for wind parks, pipelines and industrial plants.



Pages 10-11

Overview of **organic polysilazanes** and **inorganic polysilazanes** features, application advice and ordering information.

OPSZ & PHPS

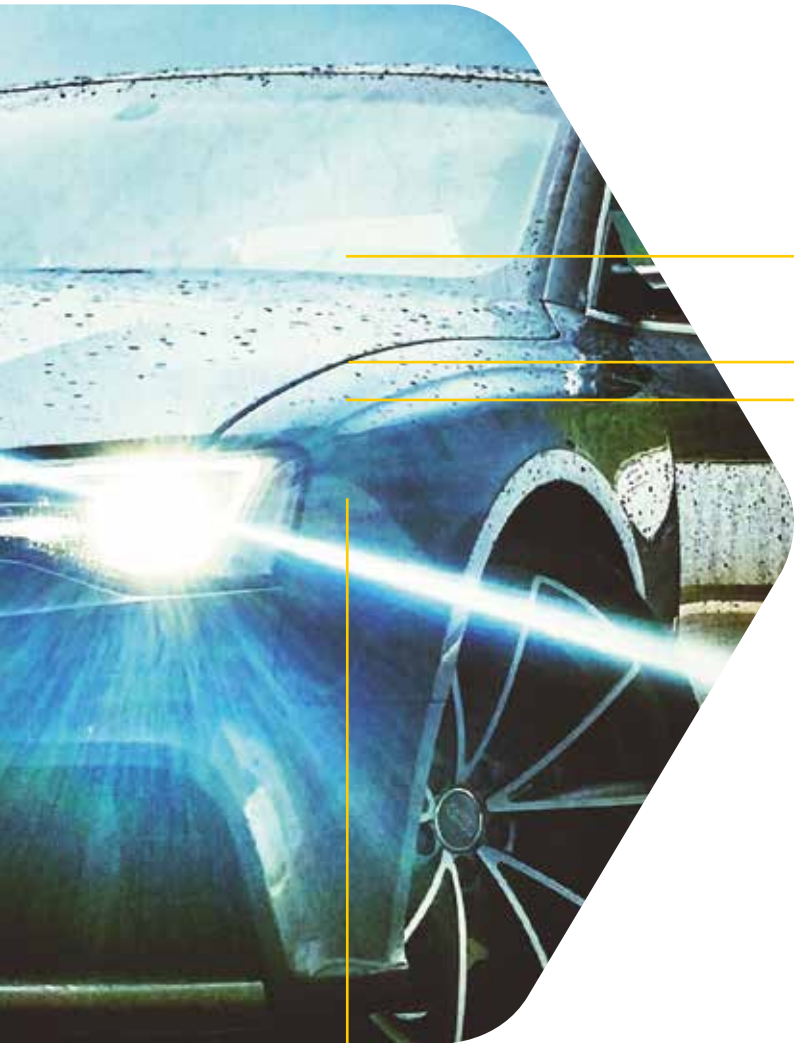
... for Mobility

A car with a gleaming new exterior, protected by polysilazanes against wear and abrasion, preserving its value. The car finish resists scratches and loss of gloss. Thermal barrier coatings reduce the heat loss of exhaust and engine parts, improving overall efficiency. High-temperature coatings give exhaust parts very good protection against wear, abrasion and stains.



Anti-graffiti coatings

Graffiti is a real problem on trains. It not only causes an unsightly appearance but destroys the protection of the coating. Our material is the best solution for preventing graffiti damage.



Interior coatings

Our polysilazanes give interior car parts long-lasting protection, conserve the pleasant tactile appearance of the materials employed and add easy-to-clean properties.

Thermal barrier coatings

Our products enable a good exhaust heat management by reducing heat loss in manifolds and headers. Coated pistons can lower fuel consumption considerably.

High-temperature coatings

Capable of handling temperatures of up to 1000 °C, our polysilazanes are perfect for protecting systems and engine components.



Car refinishing and beauty

Polysilazane products help preserve the beauty of car finishes by employing a technology that is superior to most standard waxes. Dirt can be removed easily with just water and a small amount of cleaner, so extensive car washing is no longer necessary.



Glass coatings

Our solutions allow brilliant, easy-to-clean glass surfaces. Dirt can be removed easily, thus reducing cleaning costs.

Weather-resistant coatings

Our products offer long-lasting, optimal protection of metal facades against all kinds of damage.



Anti-corrosion protection

Even the toughest weather conditions and highest moisture levels cannot impair the pristine appearance of building facades.



A skyscraper with a perfectly protected facade underlining its architectural brilliance. Buildings are exposed to the impact of sunshine, rain, moisture and snow. **Our solutions give you long-lasting protection against these demanding environmental factors.**

... for architecture



Wear and abrasion resistance

Our polysilazane products protect pristine surfaces in kitchens. For example, stainless steel sinks with an anti-scratch protective layer preserve their new and bright appearance while simultaneously offering easy-to-clean properties.

In an industrial setting, you want nothing but top-in-class protection of facilities such as wind parks, pipelines or industrial plants. Strong corrosion protection and resistance against weathering are imperative.

... for industry

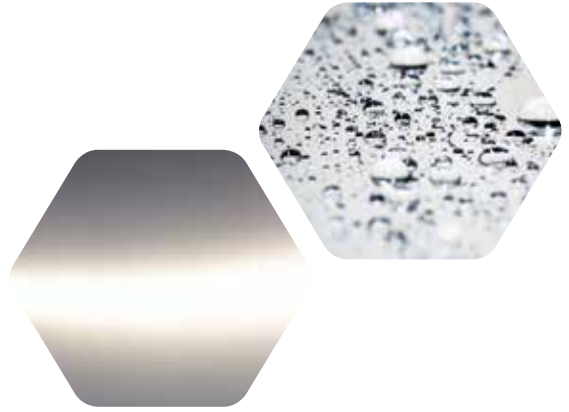


Optimal protection against corrosion
Our materials form dense protection layers on the substrates, not giving corrosion any chance.



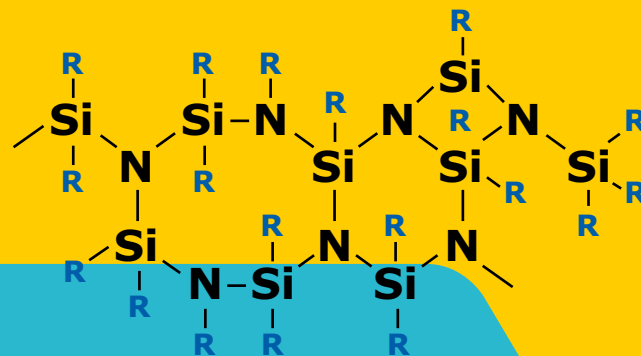
Protection against weathering and wear

Strong UV radiation and impact from ever-changing weather conditions require coatings that can also withstand tough environments.



polysilazanes: a new class of silicon polymers

	Organic polysilazanes OPSZ	Inorganic polysilazanes PHPS
Product properties	Transparent, low-viscosity polymers available as 100% solvent-free solids	Low-viscosity polymers available as 20% solution in various solvents
General curing conditions	Thermal, moisture or UV cure (depending on product)	Thermal and moisture cure
Structure after full curing	Forms a dense ceramic layer with Si-N-Si and Si-O-Si structures	Forms a quartz glass-like silicon dioxide film
Dry film thickness and properties of cured films	1-30 µm, medium surface hardness (up to 5H depending on formulation and substrate), strongly hydrophobic surface	<1 µm, high surface hardness (up to 9H depending on formulation and substrate), hydrophobic surface
Detailed information	Our organic polysilazanes are marketed under the brand name Durazane™. The products form ceramic layers that are highly temperature resistant and provide excellent corrosion protection and weathering resistance. Due to their strong hydrophobic properties, they provide good protection against graffiti and exhibit easy-to-clean properties.	We offer inorganic polysilazane resin solutions in our NN, NL, NP and NAX series. Inorganic polysilazane based coatings provide a wide range of substrates with anti-scratch properties and excellent chemical and thermal resistance.
Combination possibilities when formulating	Blends of different OPSZ and/or PHPS products and each of these in combination when formulating with other resins in solvent-borne formulations are possible. No compatibility with water, protic solvents such as alcohols and other acidic components.	
Application advice	OPSZ and PHPS can be applied via spray coating, wiping or dipping. Proper preparation of substrate is crucial for maximum adhesion and coating performance. Remove any moisture, oils and contaminants with a degreasing solvent. Keep the bottles away from moisture and tightly closed.	



organic polysilazanes OPSZ

Organic polysilazanes*	Item No.
Durazane™ 1033	214042
Durazane™ 1066	214047
Durazane™ 1085	214328
Durazane™ 1500 rapid cure	214043
Durazane™ 1500 slow cure	214044
Durazane™ 1800	214049

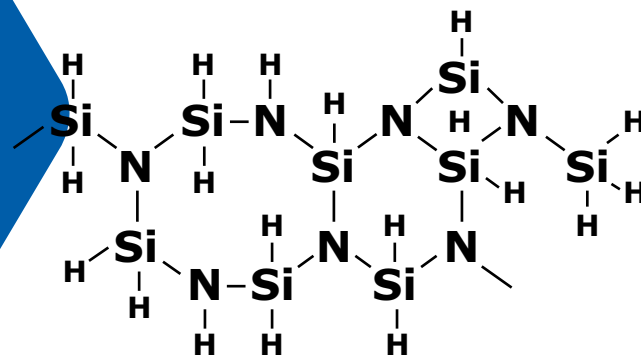
Technical Data Sheets and specifications are available separately, on request.

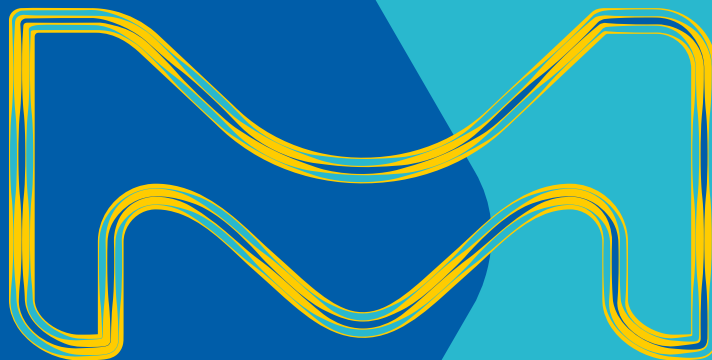
* **Please note:** Organic polysilazanes are subject to U.S. re-export jurisdiction and are prohibited from export to any country identified in Country Groups D:1 (Armenia, Azerbaijan, Belarus, Burma, Cambodia, China (PRC), Georgia, Iraq, Kazakhstan, North Korea, Kyrgyzstan, Laos, Libya, Macau, Moldova, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Vietnam), E:1 (Iran, North Korea, Sudan, Syria) or E:2 (Cuba). Countries listed above are designated in Supp. No. 1 to part 740 of the EAR, version from December 3rd, 2015. Please note that only the latest country list on the BIS website is and will be binding (<https://www.bis.doc.gov/index.php/regulations/export-administration-regulations-ear>).

inorganic polysilazanes PHPS

Inorganic polysilazanes	Item No.	Portfolio availability		
		Europe	Asia	Americas
NN 120-20	214220	•	–	•
NN 120-20 (A)	214503	•	–	•
NP 110-20	213554	–	•	–
NL 120A-20	181814	–	•	–
NN 110-20	177831	–	•	–
NAX 120-20	213292	–	•	–
NN 120-20	213603	–	•	–

Technical Data Sheets and specifications are available separately, on request.





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