EUROPE, MIDDLE-EAST, AFRICA, LATIN AMERICA
Evonik Resource Efficiency GmbH
Business Line Silica
Rodenbacher Chaussee 4
63457 Hanau-Wolfgang
Germany
PHONE +49 6181 59-12532
FAX +49 6181 59-712532
ask-si@evonik.com
www.evonik.com
www.sipernat.com

NORTH AMERICA
Evonik Corporation
Business Line Silica
299 Jefferson Road
Parsippany, NJ 07054-0677
USA
PHONE + 1 800 233-8052
FAX + 1 973 929-8502
ask-si-nafta@evonik.com

ASIA, PACIFIC
Evonik (SEA) Pte. Ltd.
Business Line Silica
3 International Business Park
#07-18 Nordic European Centre
Singapore 609927
PHONE + 65 6 809-6877
FAX + 65 6 809-6677
ask-si-asia@evonik.com

IB-302-EN-02-2017/10-Tools

EVONIK
POWER TO CREATE

AEROSIL®

AEROSIL® for Adhesives and Sealants

Industry Brochure 302

EVONIK
POWER TO CREATE

Contents

Planetary dissolver for the production of adhesives & sealants
(Manufacturer: Hermann Linden, Marienheide/Germany)

AEROSIL® – more than just a powder

Dr. Harry Klöpfer, chemist at Degussa, one of the predecessor companies of Evonik, and inventor of AEROSIL® fumed silica.

Evonik developed AEROSIL® fumed silica more than 70 years ago, and has led the world's development and production of fumed silica ever since. Many things as we know them in our daily lives would be unthinkable without AEROSIL® fumed silica.

For example, AEROSIL® fumed silica is found in earthquake-proof building foundations, in silicone sealing compounds for bath tubs, in the plastic walls of yachts, in insulating materials for ceramic stove tops, and in paints and coatings.

AEROSIL® fumed silica has become indispensable, not just as a product in itself, but because the highly specialized, environmentally- friendly technologies enabled by AEROSIL® products have become firmly rooted in numerous industries.

In addition to the actual AEROSIL® products, we offer real solutions for many technical applications, with unbeatable advantages. Our specialist teams in Research and Development take care of a continuous improvement of the products and their application. Competent and dedicated laboratories work together with the customers to solve problems regarding application and handling techniques.

Efficient logistics guarantee deliveries on time. Well-designed packaging solves technical handling problems before they can occur. Technical support and customer care are available worldwide. Our policy regarding the long-term availability of AEROSIL® products offers planning security and prevents unexpected investment costs for alternative solutions. In addition, our worldwide presence helps us to combine our expertise to form an international network.

In this way, we work hand in hand with our customers towards providing individual solutions for their systems, to meet with their high standards, thus making their products even more successful.

Bonding with the customer to find solutions that stand the test of time

HISTORY OF TECHNICAL ACHIEVEMENT

Adhesives and sealants are employed in many different industries and are increasingly finding new applications, especially in the automotive industry.
Thanks to the development of special hydrophobic AEROSIL® fumed silica, it has been possible to produce structural adhesives that belong to the future technologies in automobile construction. Modern structural adhesives enable the joining of various materials, such as steel, aluminum, magnesium, and plastics.

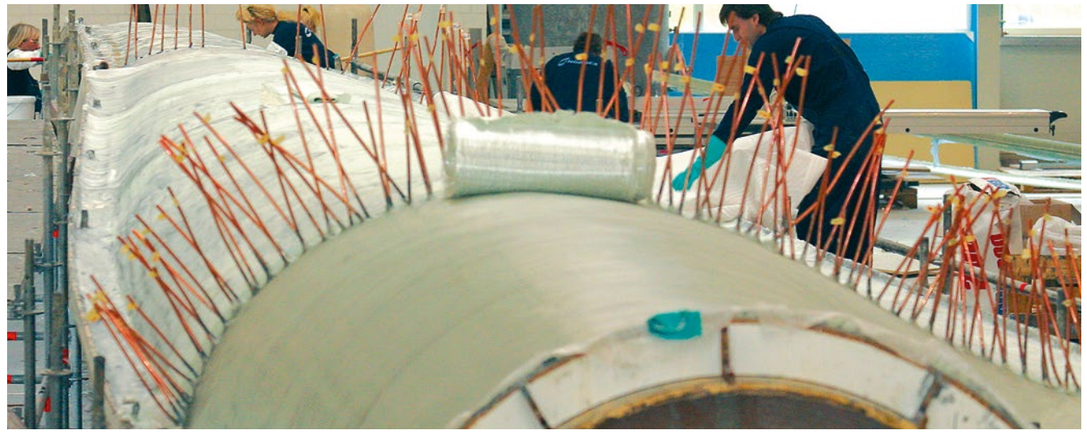
The use of new processes, such as weld bonding, which combines the individual advantages of gluing and spot welding, makes it possible to improve the mechanical strength of the automobile body (chassis), especially for improving the crash safety and sound dampening. Furthermore, structural adhesives have made it possible to construct lightweight design components, such as bonded roof modules. Apart from the automotive industry, modern adhesives belong also to the future technologies in the construction, wind energy, electronic, and chemical fixing industries.

WIDEST PRODUCT RANGE

Numerous systems can benefit from the technical advantages and improvements that may be achieved with Evonik's large selection of AEROSIL® grades, which have been specially developed for the adhesives and sealants industry. These special AEROSIL® grades not only improve the rheological and mechanical properties, but also act as anti-settling agents, and improve the storage stability and processability of adhesives and sealants.

AEROSIL® milestones for the adhesives and sealants industry

Introduced to the market	AEROSIL® grades/new products	Applications
1962	AEROSIL® R 972 Development of the first industrially-produced hydrophobic fumed silica in the world	Adhesives and sealants based on silicones, polyurethanes, polysulfides and silane modified polymers
1986-1989	AEROSIL® R 202, AEROSIL® R 805, AEROSIL® R 812, AEROSIL® R 812 S Development of highly hydrophobic fumed silicas especially as effective thixotropes for polar adhesives & sealant systems	Adhesives and sealants based on epoxies, polyurethanes, silane modified polymers and vinyl ester resins
1995-1996	AEROSIL® R 104, AEROSIL® R 106 Development of further hydrophobic fumed silicas, and AEROSIL® R 816 especially for water based systems	Adhesives and sealants based on silicones, silane modified polymers and water based systems
1998	AEROSIL® R 8200 Development of a structure-modified, highly hydrophobic fumed silica as excellent reinforcing filler modified with hexamethyldisilazane (HMDS)	Adhesives and sealants based on silicones, silane modified polymers, epoxies and polyurethanes
2001	AEROSIL® R 7200, AEROSIL® R 711 Development of AEROSIL® grades modified with methacrylate functional silanes	Adhesives and sealants based on acrylates, polyester and vinyl ester resins
2005	AEROSIL® R 9200 Development of a structure-modified, hydrophobic fumed silica modified with dimethyldichlorosilane (DDS)	Adhesives and sealants based on silicones, silane modified polymers, epoxies and polyurethanes
2012-2013	AEROSIL® R 208 Development of a highly hydrophobic fumed silica as very effective thixotrope for polar adhesives & sealant systems	Adhesives and sealants based on epoxies, polyurethanes, silane modified polymers and vinyl ester resins



Manufacturing rotor blades for wind turbines (Nordex AG, Norderstedt/Germany)

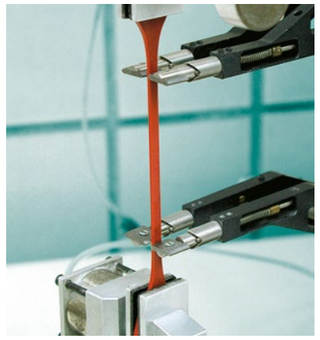
AEROSIL® for silicone adhesives and sealants

WHEN IT COMES TO REINFORCEMENT AND TRANSPARENCY, AEROSIL® IS ESSENTIAL

Structural glazing adhesives for all-glass building facades

Uses for silicone sealants in bathrooms (e.g. leak-proofing shower stalls)

Application of a silicone sealant



Testing the mechanical properties of a silicone sealant compound

One of the most important applications of AEROSIL® fumed silica in the adhesives and sealants industry is its use as an active reinforcing filler to improve the mechanical properties of silicone sealants. Without AEROSIL® fumed silica, the mechanical properties of silicone sealants would be inadequate, making it impossible to perform as a watertight, durable link between similar and dissimilar materials. AEROSIL® fumed silica is also used successfully in transparent silicone sealants for waterproofing tub surrounds and shower stalls. Glass has become a fashionable building material over the past few years. All-glass constructions do not merely fulfill modern anesthetic desires; they also improve the acoustic properties of buildings, offer superior protection from weathering, and guarantee an excellent interior living environment. Structural glazing is used for the static bonding of glass to a metal construction. These adhesives generally consist of one- or two-component silicone materials. AEROSIL® fumed silica improves both the mechanical and rheological properties of these materials in this application.

The AEROSIL® fumed silica grade with the best properties for this important application is dependent upon the demands made by the manufacturer on the formulation of the silicone sealant. AEROSIL® 150 and AEROSIL® R 972 are AEROSIL® grades most frequently used in the formulation and production of silicone sealants.

AEROSIL® 150 demonstrates very good reinforcing properties in silicone sealants, and also improves their processability.
The hydrophobic grade AEROSIL® R 972 offers further advantages over the hydrophilic grade AEROSIL® 150; for example, an improved storage stability and processability of the non-crosslinked silicone sealant.

Due to their fine particle size, AEROSIL® R 812 S or AEROSIL® R 106 are especially well suited for application in transparent silicone sealants, which are used, for instance, to seal shower stalls. Structural glazing adhesives based on silicone materials are extensively tested with regard to product quality, mechanical strength, aging, and compatibility. The hydrophobic grades AEROSIL® R 972, AEROSIL® R 812 S, and AEROSIL® R 8200 are suited for the fine tuning of the mechanical and rheological properties of silicone materials. They are also superior to the hydrophilic products in their improved resistance of the formulations to aging, thanks to their extremely hydrophobic nature.

High filler loading with low-thickening can be obtained using AEROSIL® R 8200 and AEROSIL® R 9200 which makes it possible to formulate structural glazing with excellent mechanical properties.

AEROSIL® for adhesives and sealants based on silane-modified polymers (SMP)

AEROSIL® PROVIDES INNOVATIVE SMP BASED ADHESIVES AND SEALANTS WITH AN EDGE

Adhesives and sealants based on SMP polymers consist mainly of MS Polymers™ , STPU or STPE polymers, fillers, thixotropes, reinforcing agents, silanes and drying agents. These systems are also called hybrid adhesives and sealants.

The main applications for SMP based adhesives and sealants are:

- Floorcovering adhesives and construction
- Automotive, transportation and marine applications
- Sanitary applications, e.g. bonding of mirrors

The main advantages are:

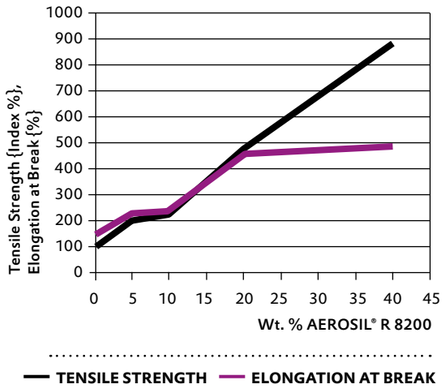
- Good adhesion and excellent processability
- Higher mechanical properties compared to silicone sealants
- Isocyanate and silicone-free
- Paintable
- No bubble formation

Only hydrophobic AEROSIL® grades are recommended as thixotropes and reinforcing agents for these systems, because SMP based adhesives and sealants cure via moisture and silane functionality of the polymers.

Especially AEROSIL® R 972, AEROSIL® R 202 and AEROSIL® R 208 are suggested as thickening agents and thixotropes as well as reinforcing agents for filled systems, while AEROSIL® R 972, AEROSIL® R 106, AEROSIL® R 805 and AEROSIL® R 812 S are recommended for transparent SMP based adhesives and sealants.

The structure-modified, hydrophobic fumed silica AEROSIL® R 8200 is suggested as excellent reinforcing agent both for filled and for transparent SMP based adhesives and sealants.

AEROSIL R 8200 AS EXCELLENT REINFORCING AGENT FOR MS POLYMER™ SEALANTS



AEROSIL® R 8200 improves both tensile strength and elongation at break of transparent MS Polymer™ sealants!

Recommended AEROSIL® grades for SMP based adhesives and sealants:

SMP based adhesives and sealants	AEROSIL® Grades	Wt.-%	Incorporation methods
Filled	**AEROSIL® R 972** **AEROSIL® R 106** **AEROSIL® R 202** **AEROSIL® R 208**	1-6	Planetary-dissolver, planetary-mixer, dissolver with scraper
Transparent	**AEROSIL® R 972** **AEROSIL® R 974** **AEROSIL® R 106** **AEROSIL® R 805** **AEROSIL® R 812 S**	1-12	Planetary-dissolver, planetary-mixer, dissolver with scraper
High-strength	**AEROSIL® R 8200** **AEROSIL® R 9200**	5-30	Planetary-dissolver, planetary-mixer, dissolver with scraper

AEROSIL® for adhesives and sealants in the automotive industry

USING AEROSIL® TO OPTIMIZE YOUR PRODUCTION PROCESSES CREATES STRONG BONDS

Bonding is the technology of the future in the modern automotive industry. There are tailor-made adhesive systems for nearly every application in the construction of vehicles. The use of structural adhesives for building automobile bodies has steadily increased since the 1990s, and offers the following advantages over classic bonding techniques, such as spot welding:

- Bonding of different materials, such as steel, aluminum, magnesium, and plastics
- Ideally for lightweight design components, such as bonded roof modules
- Improved mechanical strength
- No thermal influence on the materials
- Low-stress composite structures without load peaks
- Useful for difficult-to-reach components

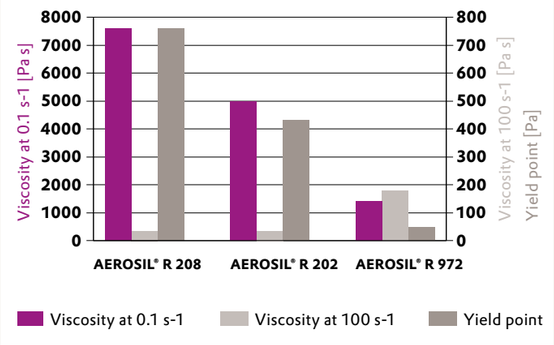
Meanwhile, many automobile bodies are bonded by weld bonding with an epoxy structural adhesive. Spot welding is used additionally to fix the part until the adhesive has cured completely.

Polyurethane structural adhesives are used to bond automobile body parts made of fiber glass reinforced polyester resins. The automobile body parts are attached by a structural adhesive to a steel frame, which bears the main weight of the chassis and the engine. The properties of structural adhesives and the demands placed on them are extremely diverse and include:

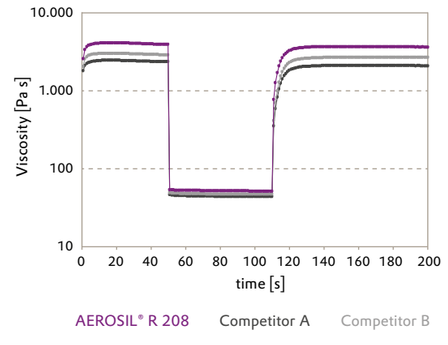
- Improved rigidity and strength of the automobile body
- Improved crash properties of components
- Waterproofing of the raw automobile body
- Corrosion resistance
- Resistance to washing out by means of rheology or pre-curing
- Compatibility with immersion coatings
- Adhesion to oily substrates, ability to be thoroughly welded
- Good viscosity stability and sag resistance
- Process stability, string resistance
- Resistance to aging, good storage stability

AEROSIL® improves structural adhesives for construction of automobile bodies

9 % fumed silica in a 1 K PU polymer (NCO prepolymer)



6 % fumed silica in epoxy resin 3-interval-time-test (structure recovery)



Another important application for adhesives and sealants in the automotive industry is the window glass segment for the direct sealing of windshields and side windows. Windshield sealants were introduced to the automotive industry in the 1970s, and remain standard practice today.

Polyurethane adhesive sealants are used for this application. The requirements for windshield sealants are:

- Direct adhesion, adhesion on glass, plastics, metals, and coated substrates
- Fixing of components with adhesives during assembly
- Improved structural integrity
- Increased rigidity and improved damping properties of the automobile body
- Low electrical conductivity

The hydrophobic grade AEROSIL® R 202 is a very effective thixotropic and anti- settling agent for structural adhesives based on epoxy resins and polyurethanes.

AEROSIL® R 202 and AEROSIL® R 805 provide epoxy resin-based structural adhesives with sag and process stability, combined with very good storage stability. The hydrophobic grades AEROSIL® R 972 and AEROSIL® R 202 have been used successfully for many years as thixotropic and reinforcing agent in windshield sealants based on polyurethane.

Both hydrophobic AEROSIL® fumed silica grades are used to achieve highly viscous, thixotropic, storable adhesive beads, which remain ready for application with automatic glue guns onto the automobile body components.

AEROSIL® R 208 is a highly hydrophobic fumed silica and a very effective thixotrope for polar adhesives & sealant systems. For example, polyurethane sealants thickened with AEROSIL ® R 208 do show higher yield points, higher viscosities at low shear rates, and higher shear shinning behavior compared to AEROSIL® R 202 and AEROSIL® R 972 (compare diagram “9 % fumed silica in a 1 K PU polymer”).

Hydrophilic AEROSIL® grades like AEROSIL® 200, AEROSIL® 300 and AEROSIL® 380 are mainly used as thixotropes for PVC and PMMA plastisols for underbody protection.

AEROSIL® fumed silica are used in adhesives and sealants to bond and seal cockpits, fuel tanks, and pressurized cabins

AEROSIL® for adhesives and sealants in the aircraft industry

WITH AEROSIL® YOU'LL ALWAYS WIN BY A NOSE – EVEN UNDER MAXIMUM TEMPERATURE FLUCTUATION

A large number of different adhesive and sealant systems have gained significance in the aircraft industry. Examples of some of the important applications requiring adhesives and sealants are the bonding and sealing of cockpits, fuel tanks, pressurized cabins, and the embedding of electronic components.

The properties required for these adhesive and sealant systems are often determined by using standardized test methods, some of which come from the military field. The industry utilizes a wide selection of testing standards, such as ASTM or UL.

Adhesives and sealants based on epoxy resins, methacrylates, silicones, and polysulfides are used to seal cockpits and window panes. The bond must be able to withstand high pressure differences and temperature changes, as well as displaying high UV resistance.

Sealants are used to seal joints or entire inside walls of fuel tanks. The sealants used for fuel tanks are based on polysulfide polymers, epoxy resins, or silicones. Sealants are also required in the aircraft industry to seal cabins, which have to withstand high pressure. The key parameters for this kind of sealant are elasticity and high strength. Potting compounds and adhesives are additionally used to encapsulate and protect electronic components.

Systems based on polyurethanes, silicones, or epoxy resins are used for these applications. Finally, adhesives and sealants are also used to prevent corrosion.

Corrosion occurs when airplanes come into contact with salt water. Adhesives based on cyanoacrylate, methacrylate, or epoxy resin are used for this application. AEROSIL® products can be used to achieve a wide range of effects in these systems; AEROSIL® fumed silica acts as a thixotropic agent, reinforcing agent, and also as an anti-settling agent. A mere 1% of AEROSIL® fumed silica, for instance, can reduce the settling behavior of fillers in potting compounds used to encapsulate electronic devices.
The overview on page 27 of this brochure recommends the AEROSIL® product best suited for most adhesive and sealant applications.

AEROSIL® in structural adhesives for wind energy

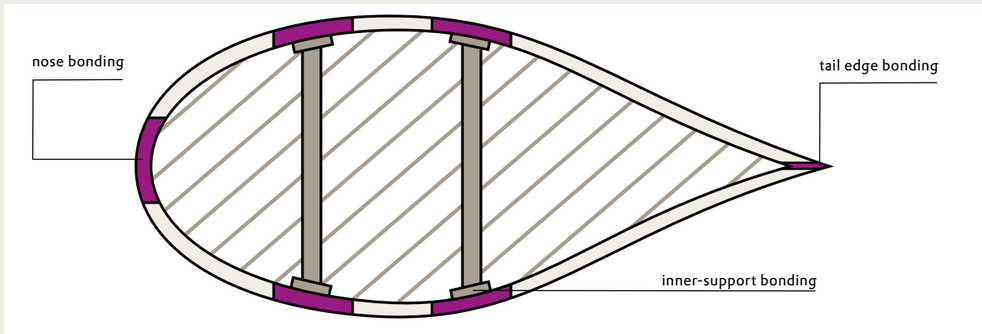
AEROSIL® PROVIDES MODERN WIND POWER STATIONS WITH AN EDGE

An important application for AEROSIL® fumed silica in the adhesives industry is its use as a thixotropic agent in special adhesives for the construction of wind turbines. Wind turbines must be able to provide twenty years of service without requiring large-scale repairs. High demands are placed on the durability behavior of the rotor blades, especially in large units with power outputs of 2.5 and 5 MW. The quality of a rotor blade is determined by the reliability of its many adhesive bonds.

The use of systems with a high degree of thixotropy is necessary to prevent the sagging of the adhesive on sloping or vertical walls during processing.
The special hydrophobic AEROSIL® grades are particularly well suited for this purpose. Currently, there are adhesives based on epoxy resin, polyurethane, vinyl ester/ polyester resin, and methacrylates available for this application. The hydrophobic AEROSIL® R 202 grade is a very effective thixotropic agent for use in polar epoxy resin, polyurethane, and vinyl ester resin-based adhesives.Furthermore, very good storage stability can be achieved with the latter adhesives when AEROSIL® R 202 is used; the viscosity builds up again even after high shear forces are applied, ensuring good stability of the adhesive.

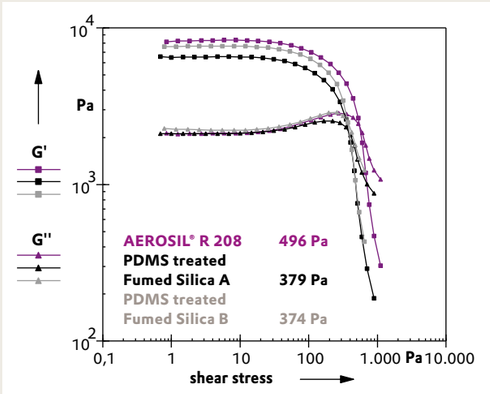
The fast-curing methacrylate adhesives are especially suitable for carrying out small repairs. AEROSIL® 200 and AEROSIL® 300 are the primarily used thixotropic agents for methacrylate-based adhesives.AEROSIL® R 711 and AEROSIL® R 7200 have methacrylate functional groups attached to their surface. AEROSIL® R 711 has a thixotropic effect, while AEROSIL® R 7200 demonstrates a low thickening effect in adhesive systems, thus enabling higher levels of loading. The use of AEROSIL® R 7200, in particular, makes it possible to improve the mechanical properties and the age resistance of radical curing adhesives or gel coats. This is an advantage for units built close to the coast or at sea, since the environmental conditions there are harsher.

AEROSIL® R 208 is a highly hydrophobic fumed silica and a very effective thixotrope for polar adhesives & sealant systems. AEROSIL R 208 is the product of choice especially for highly thixotropic adhesives with very high yield points and excellent sag resistance (compare diagram “AEROSIL R 208 in EP bonding pastes”).



Cross-section of a fiber reinforced rotor blade.

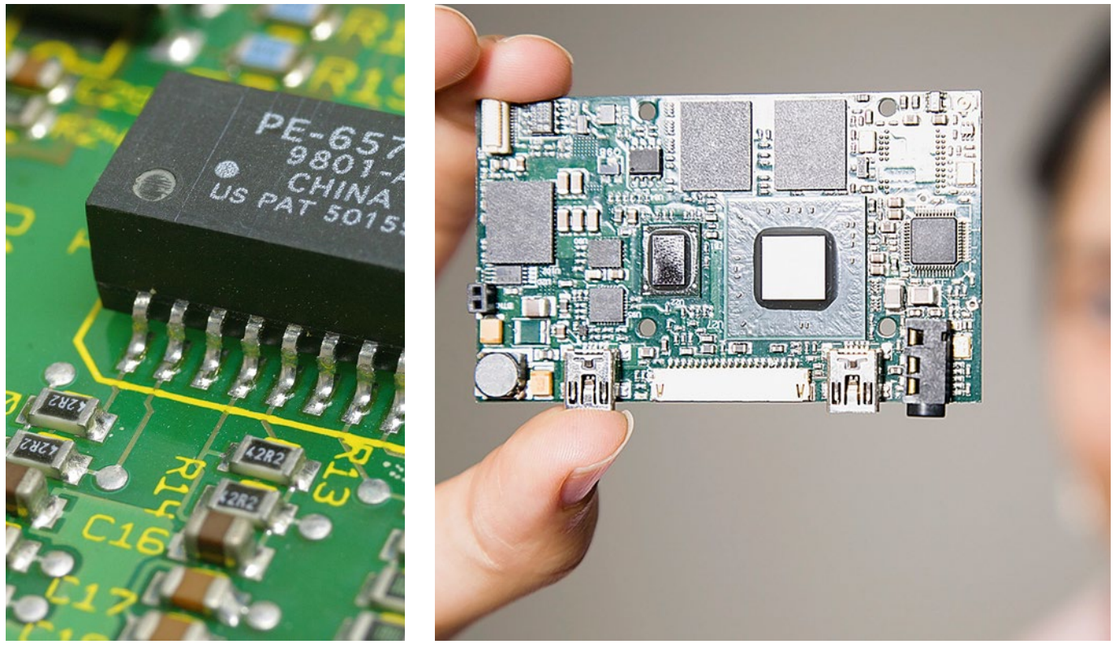
AEROSIL® R 208 in EP bonding pastes – yield point versus fumed silicas A and B



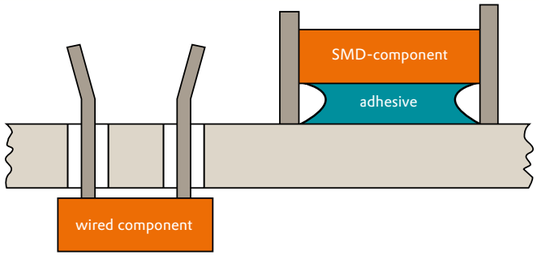
Wind turbines (Nordex AG,Norderstedt/Germany)

AEROSIL® in structural adhesives for electronic components

AEROSIL® HELPS THE ELECTRONICS INDUSTRY IN STICKY SITUATIONS



Printed circuit board with electronic components.



SMD adhesives attach the electronic device to the circuit board before completed circuit boards are turned upside down for immersion in the soldering bath.

For decades now, the electronics industry has been the fastest growing and fastest changing industry worldwide. Adhesives are used in the electronics industry to adhere electronic components to printed circuit boards and to seal electronic components (e.g. relays).

Miniaturization is the main trend in the development of circuit boards and in manufacturing technology. The introduction of SMD technology (Surface Mounted Device) in the 1980s, replacing the then standard wired elements, made it possible to achieve further miniaturization of the components and a higher degree of rationalization during fabrication. The SMD process involves the direct soldering of the device contacts onto solder spots located on the surface of the circuit board. SMD adhesives play an important role in the mounting of circuit boards with subsequent soldering. They attach the electronic devices to the circuit board before the completed circuit boards are flipped for immersion in the soldering bath. The adhesive is dispensed from a cartridge; this requires the adhesive to have a suitable drop profile.

The volume applied must be sufficient to bridge the gap between the circuit board and the SMD components. The diameter of the glue spot must remain within the space between the solder spots, without inadvertently wetting the connection spots with glue. The drop profile of the adhesive is defined by the thixotropy, the viscosity in a state of resting, and the surface tension. Furthermore, the adhesive has to fulfill additional high requirements during application:

- Thixotropic flow behavior, high viscosity in resting state
- Sag-resistance during the curing process
- High drop profile, no strings
- Constant drop profile and volume
- High green strength
- High cure strength
- Rapid cure rate
- Guaranteed rapid application of very small drops
- Bubble-free application, low moisture adsorption

Both epoxy resin and acrylate-based adhesives are available for use as SMD adhesives. The hydrophobic grades AEROSIL® R 972, AEROSIL® R 202, and AEROSIL® R 805 are very effective thixotropic agents for these adhesives. SMD adhesives can be adjusted using AEROSIL® R 972, AEROSIL® R 202, and AEROSIL® R 805, to fulfill the demands for thixotropic flow behavior, high viscosity in resting state, high drop profile, and anti-sagging during the curing process.

AEROSIL® for chemical fixing

AEROSIL® PROVIDES THE CONSTRUCTION INDUSTRY WITH THE STRENGTH TO HANG IN THERE

Chemical plugs are composite anchor cartridges which have the following advantages over mechanical plugs and dowels:

- Adaptation to uneven drill holes
- High break resistance due to elasticity
- Simple handling at building site
- Corrosion inhibiting effect

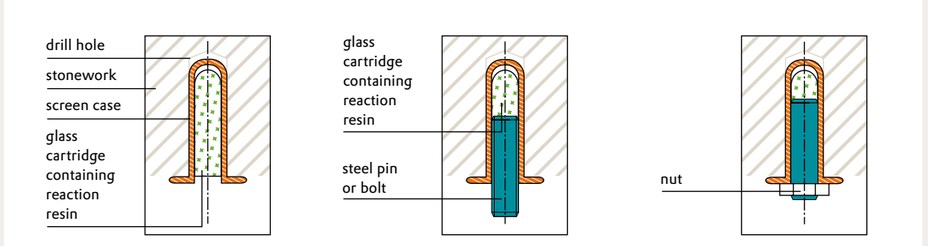
Chemical plugs are available for use in concrete applications, hollow block and aerated concrete constructions. They are used, for example, in the construction of tunnels to attach signs, lighting fixtures, or ventilators. One- and two-component systems are commercially available for different applications.

A standard one- component system consists of a glass cartridge containing a special synthetic resin, fillers, thixotropic agents, and a second smaller glass cylinder containing the hardener. In order to anchor steel pins used in the construction of bridges, the glass cartridge is placed into the drill hole inside a screen case, and is then broken open with a drill or hammer.

The steel pin is fixed directly into the reaction resin which is now beginning to cure. Improved bonding strength is achieved between the concrete, the adhesive, and the steel rod. Due to its elasticity, the system is less likely to crack than classical plugs, especially as a result of expansion within the concrete.

Finally, there are also many two-component systems available as flexible foil cartridges, so-called “side-by-side” cartridges, which require the resin and hardener to be mixed with a static mixer prior to application. These systems are advantageous if a precise drill hole cannot be made, or if an irregular drill hole already exists. Vinyl ester resins, epoxy resins, or polyester resins make up these synthetic resins. The hydrophobic grades AEROSIL® R 202 and AEROSIL® R 208 are especially suitable for providing vinyl resins and epoxy resins with an effective thixotropy, whereas the hydrophilic AEROSIL® 200 is used in polyester resin applications.

During the exothermal curing, the high degree of thixotropy and high yield value of the reaction resins prevent sagging on sloping and vertical surfaces during application. The AEROSIL® grades function additionally as anti-settling agent and prevent the settling of fillers in the cartridges during storage.



Anchoring of signs and lighting fixtures in tunnel constructions with chemical anchors.

Technical handling service of AEROSIL® enables compact solutions

WORKING WITH AEROSIL®

The handling of AEROSIL® fumed silica is receiving increased attention at a time when automation, rationalization, industrial hygiene for the protection of employees, and environmental regulations are all becoming more and more important.
Parallel to these developments, Evonik has been expanding its activities in this field for decades.The planning of dust-free, automatic plants for AEROSIL® fumed silica requires a fundamental knowledge of the products, together with experience in process engineering when handling fumed oxides. We combine our experience in this field with the specific know-how of our customers and the know-how of the manufacturers of conveying, dosage, and production units. This enables us to develop joint concepts which facilitate the handling of AEROSIL® products at our customers' plants.

Typical bag packaging of Evonik AEROSIL® fumed silica

AEROSIL® fumed silica in the bulk product container (FIBC: Flexible Intermediate Bulk Container)

Dust-free, automatic filling unit

Handling

The term handling is used to describe the techniques required to move AEROSIL® products within a customer's plant. The following topics should be regarded as the main priorities:

- Emptying of packaging units
- Silo storage
- Internal conveying
- Dosage
- Introduction of the material into the processing machinery

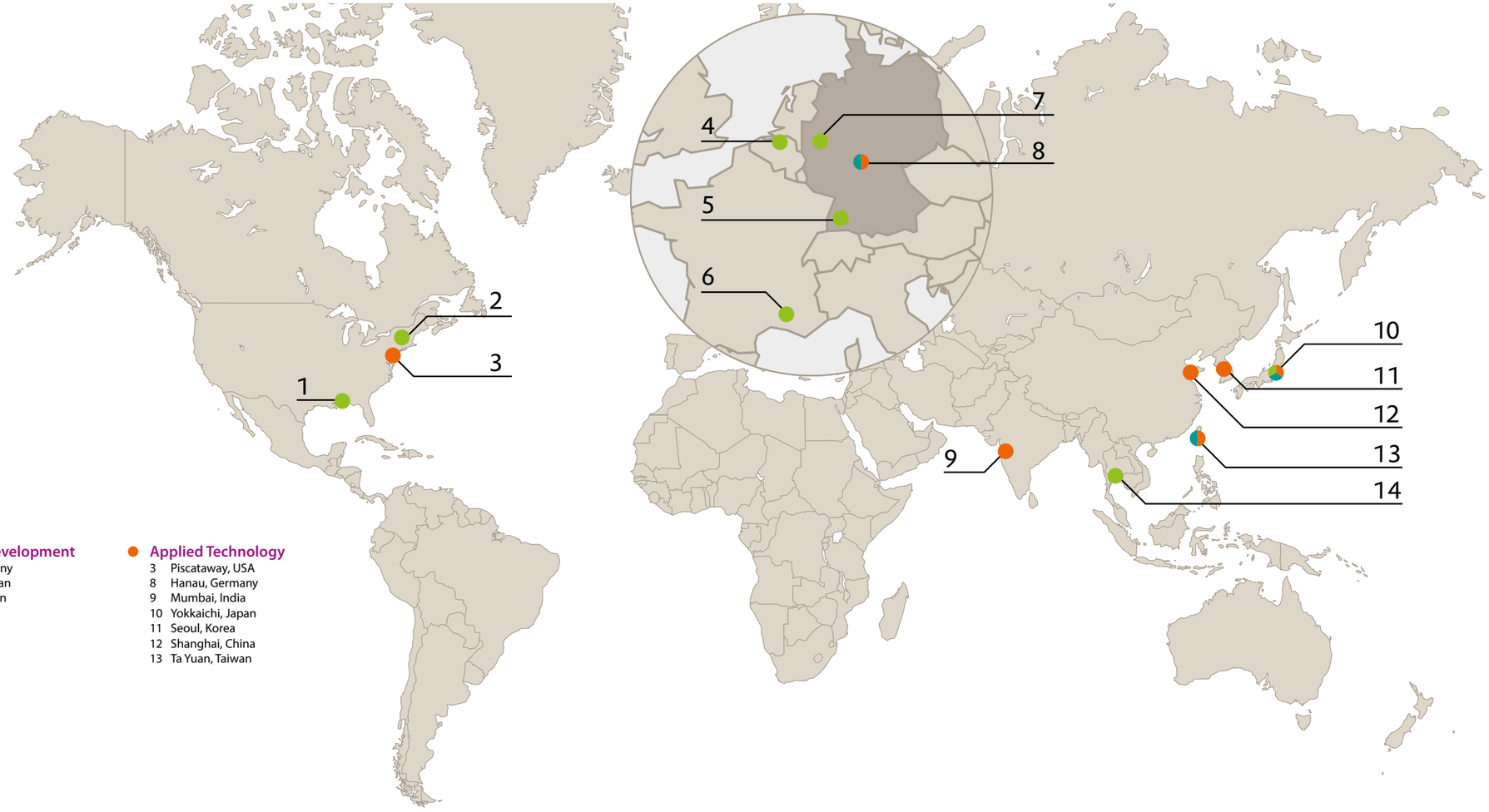
In addition to these points, the term handling also includes topics essential to putting the above steps into practice. More detailed information about the offering of this service is available from the customer service agent in your area.

Packaging

AEROSIL® fumed silica in powder form is available in three different packaging units. The standard packaging is the multi-layer paper bag, with an additional polyethylene liner for certain products. The weight of the bags range from 10 lb., 20 lb. to 10 kg in the US and from 10 to 20 kg in all other regions, and depends on the AEROSIL® grade and its set tamped density. Evonik also offers AEROSIL® fumed silica in a kind of packaging in the semi-bulk range – the FIBC (Flexible Intermediate Bulk Container). Depending on the product and its densification ratio, the weights of the filled FIBC's also vary.
Large-scale users may also have the product delivered by silo truck, which requires a corresponding storage silo at the customer's location. AEROSIL® dispersions, known as AERODISP®, are delivered in 60 kg cans, 220 kg barrels and 1.000 kg IBC's (Intermediate Bulk Containers).

Storage Stability

AEROSIL® fumed silica is chemically inert to a large extent and shows no chemical changes after long periods of storage, provided it is stored under suitable conditions. Nevertheless, it should be noted that a small number of substances do react with silicon dioxide. Due to its high specific surface, volatile substances may be adsorbed on the AEROSIL® fumed silica surface. This adsorption is reversible in the case of moisture. The adsorption of moisture is significantly reduced by the organic modification of the hydrophobic AEROSIL® grades.It is possible that prolonged periods of storage may cause the AEROSIL® products to become slightly compacted. This can lead to a minimal rise in the tamped density, which might slightly affect correlated product properties.



Production
1 Mobile, USA
2 Waterford, USA
4 Antwerp, Belgium
5 Rheinfelden, Germany
6 Roussillon, France
7 Leverkusen, Germany
10 Yokkaichi, Japan
14 Maptaput, Thailand

Research & Development
8 Hanau, Germany
10 Yokkaichi, Japan
13 Ta Yuan, Taiwan

Applied Technology
3 Piscataway, USA
8 Hanau, Germany
9 Mumbai, India
10 Yokkaichi, Japan
11 Seoul, Korea
12 Shanghai, China
13 Ta Yuan, Taiwan

The Advantage of a Global Enterprise – Local Proximity

As a leading specialty chemicals company Evonik relies on the business philosophy: „as decentralized as possible, as centralized as necessary".

The decentralized organization at all levels and in all divisions of the company is tailored to operative units which can respond to the market quickly, flexibly and on a customer-oriented basis.
As a brand operating worldwide, AEROSIL® uses production facilities, application-related service centers, research centers and commercial and technical service offices in all regions of the world.

The mere fact that we produce on 3 continents represents a decisive advantage for us and our customers when it comes to an effective world-wide delivery service. We also offer our customers the biggest service network of all suppliers on the market.

The combination of highest product quality and a focus on service and consulting is a major cornerstone of the AEROSIL® strategy. As a brand that is active worldwide we also want to combine with partners to form a strong, international network in which we concentrate our areas of expertise.

A functioning globality, which our customers experience on a local level.

Always close by.

Product overview and technical literature

Technical Overview
- AEROSIL® fumed silica

Technical Bulletin Pigments No. 27
- AEROSIL® for Solvent-free Epoxy Resins

Technical Bulletin Pigments No. 28
- Handling of Synthetic Silicas and Silicates

Technical Bulletin Pigments No. 54
- AEROSIL® for Unsaturated Polyester Resins and Vinyl Ester Resins

Technical Bulletin Pigments No. 63
- AEROSIL® fumed silica and SIPERNAT® in Sealants

TI 1374:
- Products for 1-component RTV Silicone Sealant Compounds

TI 1209
- AEROSIL® R 8200 for Silicone Rubber

Product Overview AEROSIL®
Detailed information regarding our technical literature can be obtained from:

Evonik Resource Efficiency GmbH
Business Line Silica
Rodenbacher Chaussee 4
63457 Hanau
Germany

Phone +49 6181 59-12532
Fax +49 6181 59-712532

aerosil@evonik.com
www.aerosil.com

Recommended products for adhesives and sealants

Adhesive & Sealant Systems	AEROSIL® Grades	Concentration in wt.-%	Obtainable Effects	Dispersion Equipment
Epoxy	AEROSIL® 200	1-12	Thixotropy, Thickening, Anti-Sag, Anti-Settling, Reinforcement	Dissolver, Planetary-Dissolver
	AEROSIL® 300	1-12		
	AEROSIL® R 202	1-10		
	AEROSIL® R 208	1-10		
	AEROSIL® R 805	1-11		
	AEROSIL® R 8200	5-25		
Polyurethane	AEROSIL® 200	1-7	Thixotropy, Thickening, Anti-Sag, Anti-Settling, Reinforcement	Dissolver, Planetary-Dissolver
	AEROSIL® R 972	1-8		
	AEROSIL® R 805	1-8		
	AEROSIL® R 202	1-8		
	AEROSIL® R 208	1-6		
MS/SMP/SPU	AEROSIL® R 972	1-12	Thixotropy, Thickening, Reinforcement, Anti-Sag, Anti-Settling	Dissolver, Planetary-Dissolver
	AEROSIL® R 974	1-12		
	AEROSIL® R 106	1-12		
	AEROSIL® R 805	1-12		
	AEROSIL® R 812 S	1-12		
	AEROSIL® R 202	1-12		
	AEROSIL® R 208	1-12		
	AEROSIL® R 8200	5-30		
	AEROSIL® R 9200	5-30		
Acrylate/Methacrylate	AEROSIL® 200	0.5-5	Thixotropy, Thickening, Anti-Sag, Anti-Settling, Reinforcement	Dissolver, Planetary-Dissolver
	AEROSIL® 300	0.5-5		
	AEROSIL® R 972	1-5		
	AEROSIL® R 202	1-5		
	AEROSIL® R 208	1-5		
	AEROSIL® R 711	2-10		
	AEROSIL® R 7200	5-20		
	AEROSIL® R 8200	5-20		
Polychloroprene	AEROSIL® 200	0.6-3	Thixotropy, Thickening, Anti-Sag, Anti-Settling, Reinforcement, Preventing of string formation	Dissolver
PVC-Cement	AEROSIL® 200	0.8-4	Thixotropy, Thickening, Anti-Sag, Anti-Settling, Preventing of string formation	Dissolver, Planetary-Dissolver
	AEROSIL® 300	0.8-4		
Hotmelts (Polyester, Polyamide, Polyurethane)	AEROSIL® 200	0.5-5	Thixotropy, Thickening, Anti-Sag, Anti-Settling, Reinforcement, Stabilizing, Preventing of cold flow	Kneader, Extruder
	AEROSIL® R 972	1-6		
	AEROSIL® R 202	1-5		
	AEROSIL® R 208	1-5		
	AEROSIL® R 8200	5-15		
Polysulfide	AEROSIL® 200	1-5	Thixotropy, Thickening, Anti-Sag, Reinforcement	Planetary-Dissolver, Planetary-Mixer, Kneader
	AEROSIL® R 972	1-6		
	AEROSIL® R 202	1-4		
	AEROSIL® R 208	1-4		
	AEROSIL® R 9200	5-15		
Butyl	AEROSIL® 200	1-5	Thixotropy, Thickening, Anti-Sag, Reinforcement	Dissolver, Planetary-Mixer, Kneader
	AEROSIL® R 972	1-6		
PVC-Plastisol/PMMA-Plastisol	AEROSIL® 200	0.8-1.3	Thixotropy, Thickening, Anti-Sag	Planetary-Dissolver, Kneader, Triple Roll Mill
	AEROSIL® 300	0.8-1.3		
	AEROSIL® 380	0.8-1.3		
	AEROSIL® R 974	0.8-1.3		
	AEROSIL® R 202	0.8-1.3		
Water Based	AEROSIL® 200	1-10	Thixotropy, Thickening, Anti-Sag, Reinforcement	Dissolver
	AEROSIL® COK 84	1-10		
	AEROSIL® R 972	1-7		
	AERODISP® WR 8520*	1-10		
	AERODISP® W 7520 N*	1-10		

*Easy to add and incorporate, better clarity of the dry film than powder.