

WACKER

CREATING TOMORROW'S SOLUTIONS



SEMICOSIL®

SEMICOSIL® UV

CURING AT THE SPEED OF LIGHT

100 YEARS OF INNOVATION

WACKER's story started in 1903 in the city of Munich, Germany. In establishing the chemical consortium, the founder's philosophy was one of innovation, leadership and, most importantly, partnership. Over a century later, this spirit lives on in every new product or project we undertake. From household manufacturers to space centers, our customers rely on our consistent dependability and commitment to excellence.

WACKER is a globally active chemical company with over 3,500 products serving more than 3,500 customers in over 100 countries. Our portfolio includes highly developed speciality chemicals found in countless everyday items.

WACKER serves all the major markets – from the automotive industry to the solar sector.

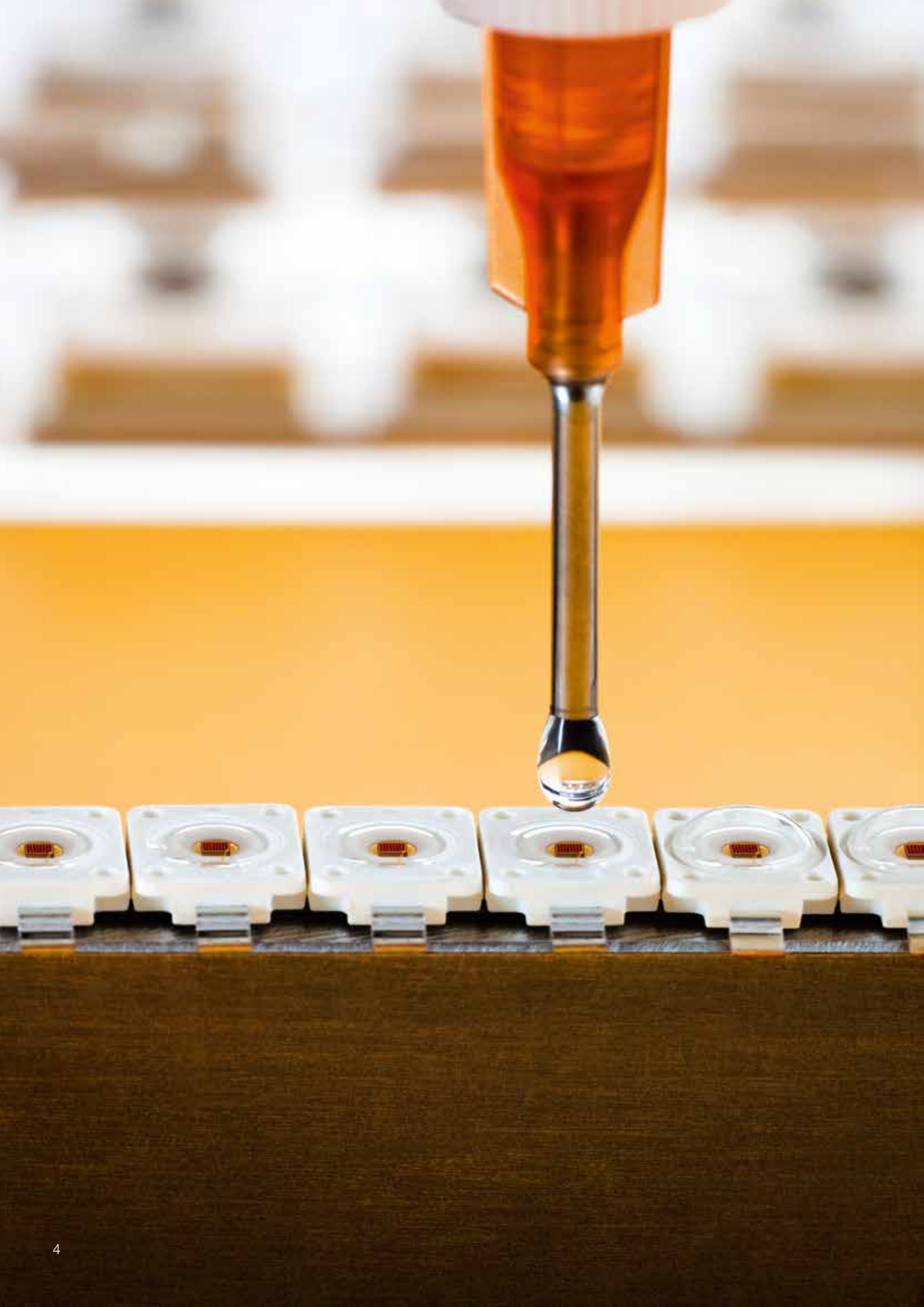
The diversity of applications is one of WACKER's strengths. We offer a wide spectrum of potential applications, with specialists that are focused on the market and close to our customers. You can depend on our five business divisions' experts in fields such as fine chemistry and biotechnology. Quality, health, safety, and environmental awareness are the cornerstones of our entrepreneurial mindset and practised at all WACKER sites.

Silicones from WACKER are to be found in an extensive range of products, and all around the world.

In everything we do, our aim is to offer our customers a constant stream of new and innovative solutions and help you achieve commercial success. Our new SEMICOSIL® UV is a perfect example of this. Discover how you can benefit from a revolutionary product that is created to bring you the maximum of efficiency in your production process.

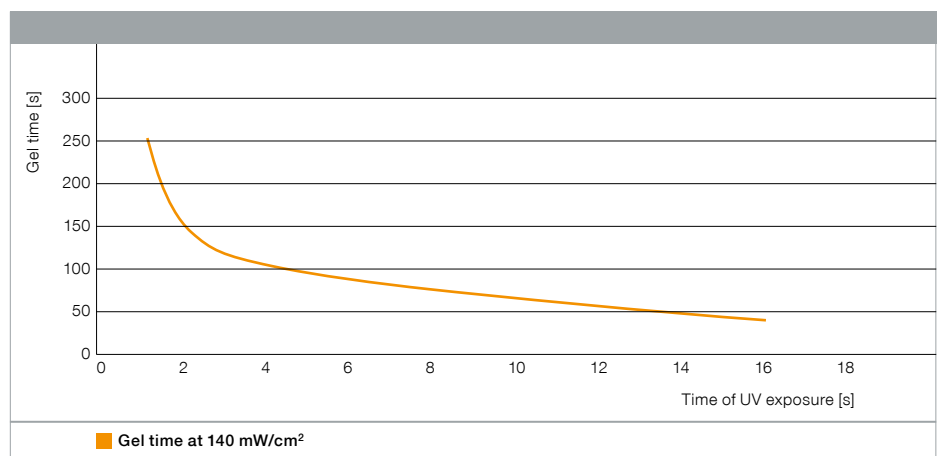






CURING WITHIN SECONDS

WACKER SILICONES introduces the fastest, most efficient way to produce electronic components: SEMICOSIL® UV. Specially developed for the microelectronics industry, SEMICOSIL® UV is a new generation of silicones that cures within seconds to minutes at room temperature. Just a quick flash of ultraviolet light is the key to new, highly efficient production processes that were previously impossible.



| UV activation (200 mW/cm²) | Curing time at 25 °C (2 mm) |
|----------------------------|-----------------------------|
| 1 s | 5 min |
| 5 s | 2 min |
| 20 s | 20 s |

Your Benefits at a Glance

- Encapsulation, sealing, coating and bonding of sensitive electronic components
- Ultra-fast curing at ambient temperature, initiated after a few seconds of UV irradiation
- SEMICOSIL® 2-part UV cure systems are still processable directly after UV-activation
- No oxygen inhibition
- Curing speed can be adjusted by the intensity and time of exposure to UV light
- Properties of cured product are not influenced by the intensity of UV light irradiation
- No photo-initiators are used, hence no by-products are formed during curing
- Curing of thick layers possible (cm range)
- Final cure can be accelerated at elevated temperature
- Minimum storage time of 6 months in tightly closed containers when stored at ambient temperature
- No risk of gelling in the mixing equipment

A TRULY BRIGHT IDEA

WACKER's new UV-active silicones not only provide long-lasting, reliable functionality of electronic components – they do so extremely fast.

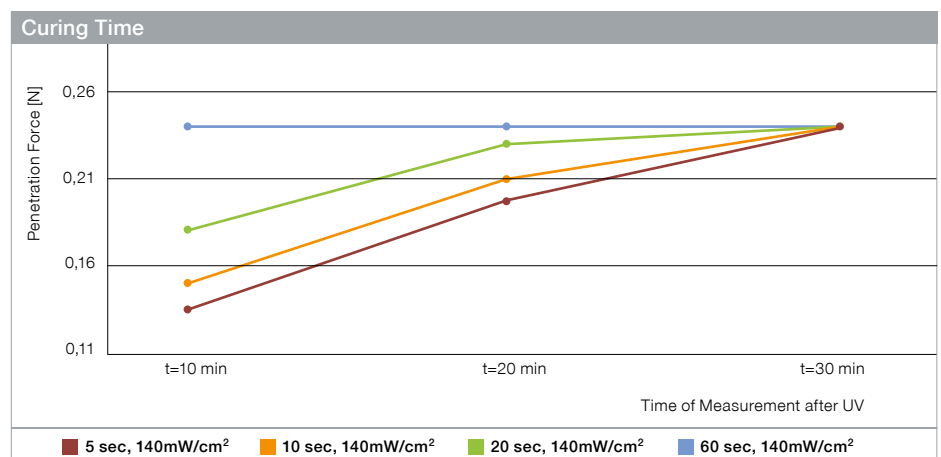
Thanks to their exceptional chemical, physical and technical properties, silicones offer ideal protection for sensitive electronic components. There is a wide range of pourable liquid silicone rubber grades and silicone gels available. Silicone gel is the material of choice for semiconductor chips since it forms a particularly flexible and compliant compound upon curing.

In order to deliver an even higher speed and efficiency for large scale series production WACKER SILICONES has developed SEMICOSIL® UV.

This addition-curing silicone is a unique, catalyst that is inactive in the dark. It requires UV light to convert it into an active form that triggers the crosslinking reaction. The higher the UV dose, the greater the number of active catalyst molecules in the formulation and the faster the silicone's curing rate.

Once active catalyst molecules have been generated, curing will continue even if the UV light is switched off. However, since the reaction is not triggered until exposed to UV light, the silicone remains workable for a long time. SEMICOSIL® UV only needs to be irradiated for a few seconds. It will then cure completely and rapidly – within a few seconds to a few minutes – at room temperature.

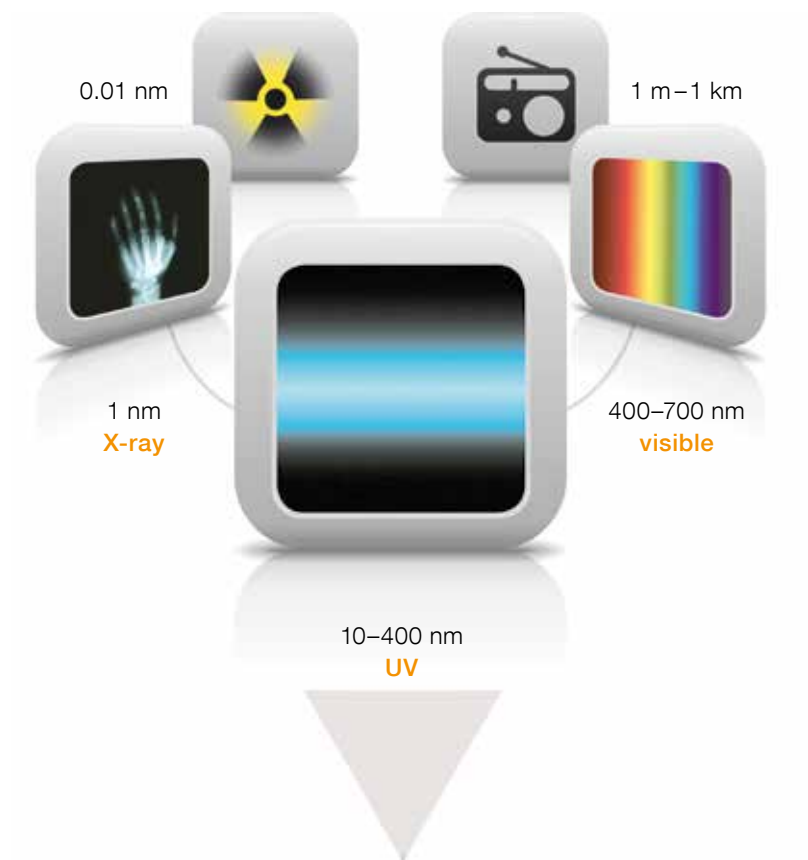
The new crosslinking technology behind SEMICOSIL® UV sets a whole new standard in the field of silicones and offers great potential. WACKER SILICONES has already developed a whole range of UV-active products for electronics manufacturers as well as applications in other divisions. SEMICOSIL® UV is just the beginning.



A FLASH OF GENIUS

Light is electromagnetic radiation. The range of a wavelength from 380 nm to 780 nm is known as visible light. The spectrum from 400 nm to 10 nm is referred to as ultraviolet (UV) light, this is further subdivided into the 4 categories: UV-A, UV-B, UV-C and E-UV.

SEMICOSIL® UV is activated by UV light from the far UV-A to the near UV-C spectra (350 nm to 250 nm). As a source for UV irradiation, commercially available D-bulbs with ozone-free quartz should be used. H-bulbs with emissions below 250 nm are not recommended.



| UV Spectra | | |
|---------------------|------|---------------|
| Ultraviolet A | UV-A | 400 nm–315 nm |
| Ultraviolet B | UV-B | 315 nm–280 nm |
| Ultraviolet C | UV-C | 280 nm–100 nm |
| Extreme Ultraviolet | E-UV | 121 nm–10 nm |

FAST FACTS: AN OVERVIEW OF OUR UV-CURE SILICONE GELS

We offer new SEMICOSIL® 2-part UV-cure silicones for sealing and encapsulation.

| Property | Test Method | Unit | SEMICOSIL® 912 + ELASTOSIL® CAT UV | |
|---|------------------------------|----------------------|------------------------------------|-------|
| Product data, uncured | | | | |
| Component | | | A | B |
| Color | | | Clear | Clear |
| Density at 23 °C | | [g/cm ³] | 0.97 | 0.97 |
| Viscosity at 23 °C | ISO 3219 | [mPa s] | 1,000 | 1,000 |
| Product data, catalyzed A+B | | | | |
| Mixing ratio, p.b.w. | | | 10:1 | |
| Pot life at 23 °C | | | 3 days | |
| Viscosity of mix | ISO 3219 | [mPa s] | 1,000 | |
| Product data, cured | | | | |
| Curing condition: 10 s UV activation (140 mW/cm²), 30 min at 150 °C | | | | |
| Color | | | Clear | |
| Density at 23 °C | ISO 2781 | [g/cm ³] | 0.97 | |
| Penetration (9.38 g hollow cone) | ISO 2137 | [mm/10] | 50 | |
| Dielectric constant | VDE 0303 T4/50 Hz | | 2.7 | |
| Recommended application fields | Encapsulation/potting | | | |

For curing, an UV lamp (Fe-lamp, D-bulb) with a wavelength between 250 and 350 nm can be used. It is not recommended to use lamp systems that emit light with a wavelength below 250 nm.

SEMICOSIL® UV offers the ideal protection for a variety of microelectronic components, including cars and PCs.



| SEMICOSIL® 942 UV | | SEMICOSIL® 949 UV | | SEMICOSIL® 949 UV + SEMICOSIL® 950 | |
|---|-------|--|-------|---|-------|
| A | B | A | B | A | B |
| Clear | Clear | Clear | Clear | Clear | Clear |
| 0.98 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| 2,700 | | 150,000 | 1,000 | 1,000 | 1,000 |
| 300 | | | | | |
| 10:1 | | 10:1 | | 10:1 | |
| 6 hours | | 3 days | | 15 min | |
| 2,500 (D = 0.5 1/s) | | 200 | | 200 | |
| 350 (D = 100 1/s) | | | | | |
| Yellowish | | Clear | | Clear | |
| 0.98 | | 0.97 | | 0.97 | |
| 60 | | 1,000 | | 1,000 | |
| Encapsulation or coating of printed circuit boards Shadow cure | | Encapsulation/potting (conector sealing) | | Encapsulation/potting (conector sealing) Shadow cure | |

SOLUTIONS THROUGH PARTNERSHIP

With a range of over 3,000 silicone products, WACKER ranks among the world's leading manufacturers of silanes and silicones. We achieve this by remaining close to our customers and focused on our markets.

WACKER's R&D departments, technical centers and production sites form a network that ensures seamless connections, fast response times, timely know-how transfer and optimum communication. From developing solutions to training your team, WACKER is with you every step of the way – and in every corner of the world.

- WACKER has a global network of production sites, with 15,600 employees on five continents spanning all key regions. So you will always find experienced WACKER contacts nearby.
- Our technical centers offer state-of-the-art applications labs to help you optimize and develop formulations for your innovations and comply with legal regulations and standards.
- The WACKER ACADEMY offers seminars and training in various centers around the world, bringing global expertise right to your doorstep.
- We also offer contacts to reliable suppliers of curing equipment. In the case of SEMICOSIL® UV, recommendations of renowned producers of UV irradiation systems are available upon request.

For further information about SEMICOSIL® UV or other innovative solutions from WACKER SILICONES, please contact us directly at: info.silicones@wacker.com



EXPERTISE AND SERVICE NETWORK ON FIVE CONTINENTS



WACKER is one of the world's leading and most research-intensive chemical companies, with total sales of €4.48 billion. Products range from silicones, binders and polymer additives for diverse industrial sectors to bioengineered pharmaceutical actives and hyperpure silicon for semiconductor and solar applications. As a technology leader focusing on sustainability, WACKER promotes products and ideas that offer a high value-added potential to ensure that current and future generations enjoy a better quality of life based on energy efficiency and protection of the climate and environment.

Spanning the globe with 5 business divisions, we offer our customers highly-specialized products and comprehensive service via 25 production sites, 21 technical competence centers, 14 WACKER ACADEMY training centers and 52 sales offices in Europe, North and South America, as well as in Asia – including a presence in China.

With a workforce of some 16,000, we see ourselves as a reliable innovation partner that develops trailblazing solutions for, and in collaboration with, our customers. We also help them boost their own success. Our technical centers employ local

specialists who assist customers worldwide in the development of products tailored to regional demands, supporting them during every stage of their complex production processes, if required. WACKER e-solutions are online services provided via our customer portal and as integrated process solutions. Our customers and business partners thus benefit from comprehensive information and reliable service to enable projects and orders to be handled fast, reliably and highly efficiently. Visit us anywhere, anytime around the world at: www.wacker.com



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