

# SOLUTIONS FOR ELASTOMERS

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Great Solutions with Small Particles



# GREAT SOLUTIONS WITH SMALL PARTICLES

## WHO WE ARE

Sachtleben is a leading manufacturer of top-quality chemical products with a unique range of white pigments and extenders. The history of the company's involvement at its Duisburg location stretches back more than one hundred years.

Sachtleben supplies the entire world with innovative products in the fields of titanium dioxide and functional additives. Our outstanding product quality is matched by our excellence in problem-solving capabilities and technical Customer Service. The main fields of application for Sachtleben's products can be found, for instance, in synthetic fibers, paints and coatings, plastics and paper. Sachtleben also manufactures specialized products for the foods, pharmaceuticals and cosmetics industries and is the right address in the field of chromatography and catalysis as well as the production of construction materials.

As a specialist in ultra-small inorganic particles, Sachtleben provides individual, innovative solutions to polymer-industry problems. Our core capability is located in the production and functionalization of ultra-small inorganic particles. This know-how is based, not least of all, on our decades of experience in the production of the most diverse range of particles on a titanium dioxide and zinc/barium basis. The challenge for us is now the development of tailor-made solutions to meet our customers' specific needs.

## SERVICE

Sachtleben has a far-reaching sales and marketing network, with the result that you will find highly qualified and capable contacts on-the-spot in more than eighty countries.

## SACHTLEBEN CORPORATE POLICY

Based on the understanding of our customer needs our key competence is manufacturing, application and development of fine disperse inorganic solid particles. Our target is to provide substantial economic value and unique functional advantages to our customers. We focus on areas where we have competitive expertise in technology, products or market intelligence. Constantly we develop innovative products and solutions for the markets we serve. In our daily operations we apply internationally accepted standards of Good Manufacturing Practice and act in accordance with the law and self-imposed industry-specific obligations such as "Sustainable Development" and "Responsible Care®". Continuous improvement of our processes, quality improvement of our products, of environmental and health protection and of safety are mandatory for our staff.

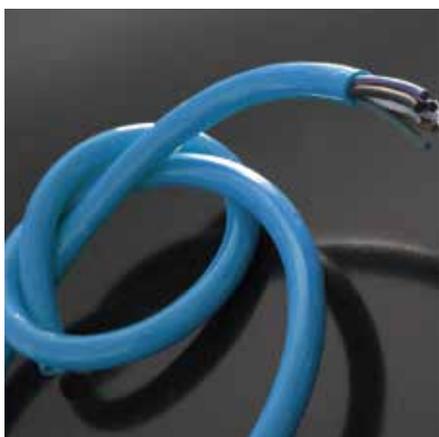
## CERTIFICATION

Naturally, quality management also includes that the development, production and sale of white pigments, extenders and products of facilities that use sulfuric acid are certified according to the standards of the Deutsche Gesellschaft für Qualitätssicherung, the German QA body. Our management system for the food industry is also subjected to regular inspections.

Certification to ISO 9001:2000, ISO 14001, ISO 22000:2005 and OHSAS 18001 are just some of the standards that our quality management system tests itself against. Our products and facilities also conform to "Kosher Mehadrin" and "Halal (TiO<sub>2</sub>) (ZnS/BaSO<sub>4</sub>)".

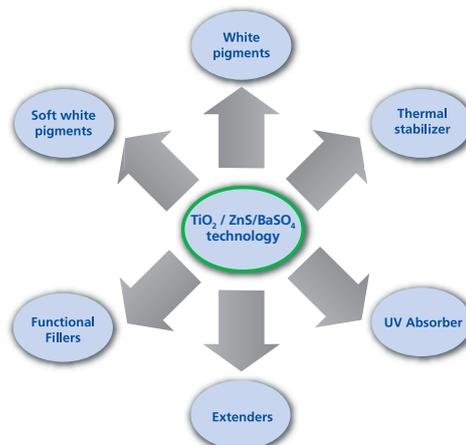
## QUALITY

Quality-awareness in development, production and all services for our customers is an essential element in our thinking and our actions. Continuous improvement of our processes in order to optimize the quality of our products, and of our environmental, health and industrial safety, are thus a basic obligation imposed on all our employees.



## SPECIALITIES FOR ELASTOMERS

Sachtleben products are already in use in a wide range of applications in the plastics industry. Our pigments, additives, fillers and extenders with their diverse functions meet the demanding needs of masterbatch producers, compounders and elastomer users.



## TITANIUM DIOXIDE

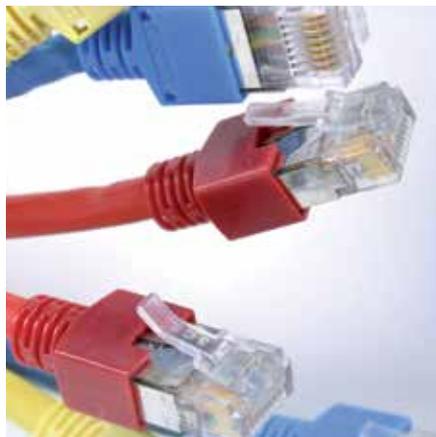
- Anatase pigments
- Rutile pigments
- Ultrafine-particles

## FUNCTIONAL ADDITIVES

- Synthetic barium sulfate
- Zinc sulfide
- Lithopone

Most elastomer compounds are black. The rubber market is now increasingly demanding white and colored commercial products, however.

Thanks to its titanium dioxide and zinc/barium technologies, Sachtleben can supply a broad range of solutions for the production and development from new of tailor-made elastomer compounds with good price:benefit ratios in a diverse selection of functions: white pigments and fillers.



# WHITE PIGMENTS – TITANIUM DIOXIDE

## TYPICAL PROPERTIES

The following properties of the white pigment are important for production of a white compound:

- Dispersibility
- Optical properties (scattering power and opacity)
- Low abrasiveness
- Cost-efficiency

Sachtleben supplies specific products that meet these demands.

## SACHTLEBEN RU 5

SACHTLEBEN RU 5 is an untreated micronized titanium dioxide pigment of rutile crystal structure possessing extremely good optical properties - high lightness and blue undertone - combined with extremely good dispersibility. As an untreated pigment, SACHTLEBEN RU 5 exhibits no release of water or non-coated compound reactivity, even at the highest processing temperatures, and is therefore used, in particular, in special polymers, such as fluorinated rubber, for example.

## HOMBITAN LW

HOMBITAN LW is an untreated micronized titanium dioxide pigment of anatase crystal structure, possessing good optical properties (high lightness and blue undertone,  $b^*$  (powder) = approx. 0.5, and excellent dispersibility in all natural and man-made elastomers. As an anatase pigment, HOMBITAN LW has an extremely low abrasiveness and is suitable for pigmentation of commercial products subjected to dynamic loadings.

## SACHTLEBEN R 320

SACHTLEBEN R 320 is an inorganically untreated but polyol coated rutile titanium dioxide pigment. Its crystal and particle sizes position SACHTLEBEN R 320 in the group of warm undertone plastics grades.

	HOMBITAN LW	SACHTLEBEN RU 5	SACHTLEBEN R 320
Titanium dioxide classification	A1	R1	R1
TiO <sub>2</sub> content [%]	approx. 99	approx. 98	approx. 98
Inorganic treatment	-	-	-
Organic treatment	-	-	Polyol
Undertone	very bluish	bluish	warm



## SACHTLEBEN RD 3

SACHTLEBEN RD 3 is alumina-zirconia surface treated rutile titanium dioxide pigment. It combines outstanding outdoor durability with excellent optical properties, i.e. high brightness and tint reducing power, opacity, excellent gloss and very easy dispersibility. SACHTLEBEN RD 3 is particularly recommended for high quality elastomer systems where durability and neutral undertone are required.

## SACHTLEBEN RKB 2

SACHTLEBEN RKB 2 is a micronized rutile titanium dioxide pigment treated with alumina and silica compounds. RKB 2 combines good weather resistance with good optical properties and gloss. The balanced combination of optical performance with durability makes this product a universal choice for elastomer applications, where a neutral/warm undertone is demanded.

## SACHTLEBEN RKB 4

SACHTLEBEN RKB 4 is a micronized rutile titanium dioxide pigment treated with alumina/ silica/ zirconia compounds. It combines excellent weather resistance with good optical properties. RKB 4 is especially designed for exterior applications because of its very high durability.

	SACHTLEBEN RD 3	SACHTLEBEN RKB 2	SACHTLEBEN RKB 4
Titanium dioxide classification	R2	R2	R2
TiO <sub>2</sub> content [%]	approx. 93	approx. 94	approx. 99
Inorganic treatment	Al, Zr	Al, Si	Al, Si, Zr
Organic treatment	Polyol	Polyol	Polyol
Undertone	neutral	neutral/warm	neutral



# WHITE PIGMENTS – ZINC SULFIDE

## SACHTOLITH L / SACHTOLITH HD-S

SACHTOLITH white pigments are produced by means of precipitation and consist of virtually pure zinc sulfide. In addition to its outstanding rheological and optical properties, SACHTOLITH is also notable for its excellent dispersibility in all polymers. Thanks to their properties, processing of high performance elastomers is no problem for SACHTOLITH. This white pigments avoids undesirable color variations in the end product.

When used in Elastomers SACHTOLITH protects the polymer against thermal degradation. SACHTOLITH thus combines two important functions in a single product, that of a white pigment and that of a stabilizer, if combined with an organic metal deactivator (MD).

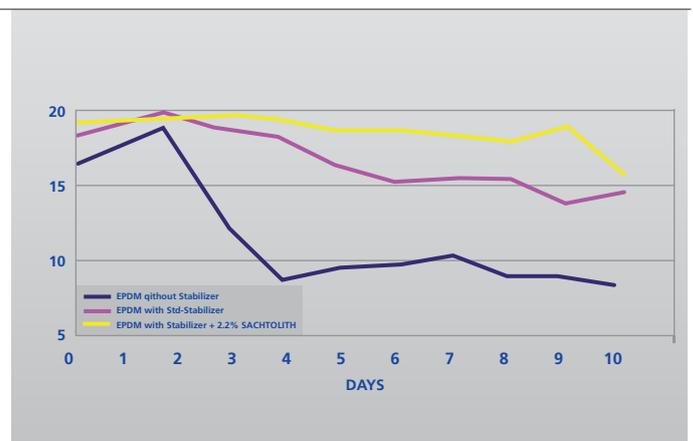
SACHTOLITH has been proven for coloration of for example

- Fluor polymers
- Nitrile rubber
- Ethylene-vinyl acetate rubber
- Chloroprene rubber
- Nitrile butadiene rubber

used in the automotive, machinery, electronic or construction industry.

### ACTION AGAINST THERMAL DEGRADATION OF EPDM

Breaking Stress of Elastomerblends after Oven Ageing at 150 °C



	SACHTOLITH L	SACHTOLITH HD-S
ZnS [%]	> 98	> 96
Colormetric index L* (powder)	> 97.5	> 97
Sieve residue <sup>1)</sup> [%]	< 0.02	< 0.004
pH	approx. 6	approx. 7
Rel. brightening power <sup>2)</sup>	approx. 55	approx. 58
Hardness (Mohs)	3	3

1) Mesh gauge 45 µm 2) Reference pigment TiO<sub>2</sub> =100%

## LITHOPONE 30%L / LITHOPONE 30%DS

LITHOPONE is a co-precipitate of zinc sulfide and barium sulfate marketed by Sachtleben in a grade containing 30% ZnS. Thanks to its rheological and optical properties, LITHOPONE offers both technical and economic advantages for the production of white and colored elastomer compounds.

Elastomer blends containing LITHOPONE are highly flexible and provide rheological advantages, particularly in case of processing on rollers and internal mixers. The relatively low Mohs hardness of these products has benefits for punch production of commercial rubber articles, since the service-lives of the punching tools are prolonged.

LITHOPONE 30%L is used primarily in natural elastomers, LITHOPONE 30%DS mainly in synthetic polymers. Thanks to its special treatment and grinding (extremely low sieve residue), LITHOPONE 30%DS offers not only optimum optical properties, but also excellent dispersibility, even at extremely high degrees of filling.

Around 50 to 70% of the quantity of anatase contained in the original formulation can be replaced with around twice the amount of LITHOPONE. Formulations containing no titanium dioxide are also possible if it is desired, for example, to exploit LITHOPONE's low abrasiveness to the full.

	LITHOPONE 30% L	LITHOPONE 30% DS
pH	approx. 7	approx. 8
Sieve residue with brush > 45 µm [%]	< 0.02	< 0.004
Color coordinate L* (powder)	approx. 98	approx. 97
Specific surface area [m <sup>2</sup> /g]	approx. 3	approx. 3
Density [g/ml]	approx. 4.3	approx. 4.3
Hardness (Mohs)	approx. 3	approx. 3



# FILLERS – SYNTHETIC BARIUM SULFATE

## BLANC FIXE micro PLUS / BLANC FIXE N

Fillers are used in the rubber industry either to improve the mechanical properties of the compound (reinforcing fillers) or to increase system density without impairing properties (inert fillers).

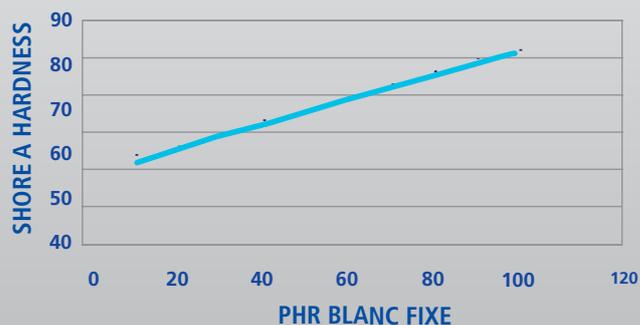
The BLANC FIXE range of products consists of inert fillers offering special advantages compared to standard filler products, such as synthetic and natural  $\text{CaCO}_3$ .

Thanks to their special post-treatment and grinding, the BLANC FIXE range of products assure excellent dispersibility in all natural and synthetic elastomers, even at extremely high filling levels.

The BLANC FIXE range of products is suitable, in particular, for use in fluoroelastomer compounds. Weight-increase requirements are met. Shore A hardness is increased significantly less by BLANC FIXE than when carbon black is used.



### BLANC FIXE IN FLUORINATED RUBBER



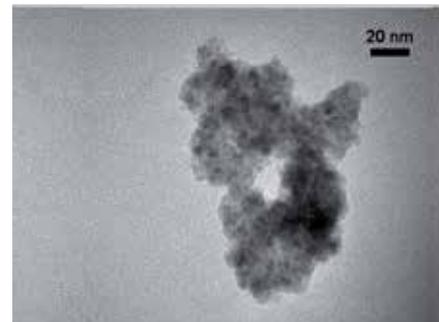
Source: Dupont Dow elastomers

	BLANC FIXE micro PLUS	BLANC FIXE N
$\text{BaSO}_4$ [%]	approx. 97	approx. 99
pH	approx. 9	approx. 9
Sieve residue w.b. > 45 $\mu\text{m}$ [%]	< 0.004	< 0.01
Median value d50 (Sed.) [ $\mu\text{m}$ ]	approx. 0.7	approx. 3
Density [g/ml]	approx. 4.4	approx. 4.4
Color coordinate L* [powder]	approx. 99	approx. 99

# ADDITIVES – ZINC SULFIDE

## SACHTOTEC MD 300

The long-term stability of elastomers is of particular importance in cable insulation systems and other functional elements in contact with water and metal. Direct contact with copper and other metals, and the use of mineral fillers - which may contain the most diverse range of impurities, in the form of metal ions - have a significant influence on the service-life of the elastomer. SACHTOTEC MD 300, in combination with organic metal deactivators and/or antioxidants, plays a decisive role here in improving long-term stability in elastomers.



SEM image of SACHTOTEC MD300

SACHTOTEC MD 300 is an ultra-fine synthetic zinc sulfide notable for its high active surface area. Thanks to its small particle size, SACHTOTEC MD300 is transparent and is also suitable for use in colored and in black formulations. The ultra-fine zinc sulfide is insoluble in the elastomer, and therefore immune to migration. SACHTOTEC MD 300 thus combines efficient and enduring stabilization in elastomer systems.

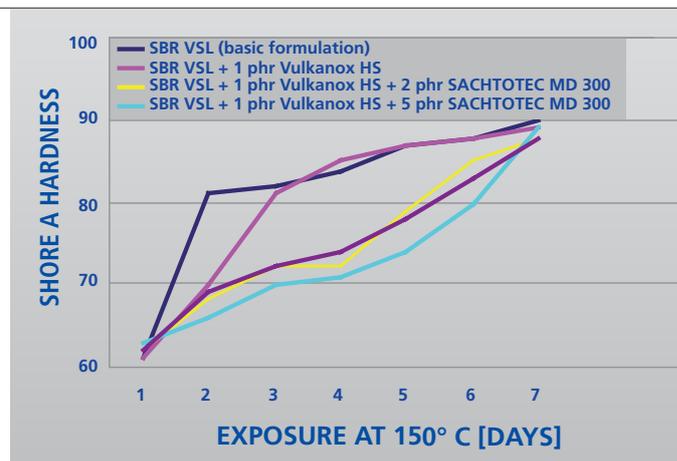
The service characteristics of elastomers are optimized by the use of high-performance additives: antioxidants, anti-ozonants, accelerators, retarders, etc. SACHTOTEC MD300 improves the temperature resistance of compounds in direct contact with metals.



## THERMAL AGEING AT 150° C

### FORMULATION

- SBR VSL 100 phr
- Active ZnO 2.5 phr
- Edenor C 18 1 phr
- Vulcacit CZ/C 1.8 phr
- Vulcacit D/C 2 phr
- Ground sulfur 2.5 phr



# THREE SITES, ONE GOAL: BEST QUALITY, SECURE SUPPLY

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## DUISBURG (GERMANY)

- 1150 employees
- 100,000 tpa  $\text{TiO}_2$
- 100,000 tpa  $\text{BaSO}_4/\text{ZnS}$



## KREFELD-UERDINGEN (GERMANY)

- 550 employees
- 107,000 tpa  $\text{TiO}_2$



## PORI (FINLAND)

- 550 employees
- 130,000 tpa  $\text{TiO}_2$



# SUSTAINABLE AND FORWARD LOOKING

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Sustainability is an important element in Sachtleben's corporate philosophy. As a responsible chemicals company, we act at all times in conformity to the relevant legal requirements and our own internal business and ethical codes. Responsibility, for us, has three vital dimensions: the social sphere enjoys at Sachtleben a priority equal to that assigned to economic and ecological aspects.

## RESPONSIBLE CARE® AND SUSTAINABLE DEVELOPMENT

We built up the preconditions for our present zero-residue titanium dioxide production in numerous steps implemented over many years. One of these was intelligent modification of our plants, to make genuinely useful materials from former byproducts. Energy-generation in Sachtleben's own power plants is now also to a very large extent based on renewable fuel sources.

In addition, we have decided to implement ISO 50001 to assure even more efficient and transparent use of energy at our production locations in Finland and Germany.

The continuous improvement of our performance in the fields of safety, health and the environment (SHE) is an important indicator at Sachtleben. This is demonstrated not only by the company's certification to ISO 14001 and OHSAS 18001; we have also made major investments in water treatment, waste-gas cleaning and other important areas. As an internationally active chemicals group, Sachtleben naturally also subscribes to the chemicals industry's own self-imposed guidelines and standards, including the "Responsible Care®" and "Sustainable Development" programs.

## SEDEX MEMBERSHIP

Sachtleben has joined the non-profitmaking Sedex organization, in order to emphasize its orientation around sustainability even more clearly. This organization, with members in more than 150 countries, has set itself the target of promoting ethical improvements in global supply chains. A secure on-line platform permits viewing - and sharing - of information on working and reference standards, health, safety, the environment, and business ethics. Joining Sedex is intended to enable our customers to see for themselves, via the Sedex data-base, exactly how ethically and responsibly we operate.



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