



适用于聚合物应用的高性能填料

HPF for polymer applications



Hidden inside – Performance outside!

Minerals Ltd.

A SUBSIDIARY OF THE QUARZWERKE GROUP

Hidden Inside – Performance Outside

HPF The Mineral Engineers 是 Quarzwerke 集团的一个部门，该部门着眼于未来，致力于在矿物学和合成基础上开发创新、功能性的高性能填料和添加剂。

我们的专业技术值得您信赖，让我们共同迎接未来的挑战吧。

HPF The Mineral Engineers is a division of the Quarzwerke Group that looks to the future with development of innovative and functional high-performance fillers and additives on a mineralogical and synthetic basis.

Trust in our expertise and let us meet the challenges of the future together.

对现代塑料的要求

人们对新型和创新型塑料的要求越来越高。通过添加某些矿物填料，可以改变和调整塑料的性能。

对于不断朝着小型化趋势发展的紧凑型部件，则可能存在因散热不足而导致发生故障的危险。

散热塑料在现代汽车概念，尤其是创新型驱动系统领域，有巨大的潜力。电气化的发展为母料和化合物制造商开辟了新的业务领域。具有适当机械和物理性能的高质量塑料变得越来越受欢迎。

聚合物和填料的巧妙组合可为广泛的新兴应用提供技术上和经济上可行的解决方案，且不仅限于汽车领域。相应地，量身定制的塑料适用于具有挑战性的应用。

Requirements for modern plastics

The demands placed on new and innovative plastics, which by nature cannot meet them, are constantly increasing. By adding certain mineral fillers, the behaviour of the plastic can be modified and adapted to customer specifications.

In the case of compact components - aggravated by the continuing trend towards miniaturization - there is a danger that the heat loss cannot be sufficiently dissipated, the assembly overheats and then fails.

Modern automotive concepts, and especially the field of alternative drive systems, hold considerable potential for heat dissipating plastics. With increasing electrification, new fields of activity are opening for masterbatch and compound manufacturers. Plastics with the appropriate mechanical and physical properties and high quality requirements are in demand.

A clever combination of polymer and fillers often offers a technically and economically sensible solution in a wide range of modern applications and is by no means limited to the automotive sector. Accordingly, tailor-made plastics are given a demanding range of tasks.



热塑性塑料 *thermoplastics*

聚丙烯

聚丙烯可用于多种应用。它可以通过注塑成型加工成电气工程、汽车制造和家用电器零件，也可以挤出成纤维和薄膜。在汽车行业，这些化合物用于制造大型零件，例如侧面板、迎宾踏板和内饰板。

聚酰胺

聚酰胺 6 和聚酰胺 66 是全球使用最广泛的工程塑料。之所以使用它们，是因为它们具有高耐热性、高硬度和刚度。另外，聚酰胺 6 具有良好的阻尼性能。矿物填料由于其不同的特性（例如形貌、硬度或表面性质）可对机械性能产生积极的影响，因此提供了一系列有趣的可能性。

聚乙烯

无论是用于食品包装、车辆制造、医疗技术、保温建筑还是农业：聚乙烯薄膜适合一系列应用，它必须满足不同的应用要求。除了机械性之外，对其光学性能如透明度，光泽度或不透明度也有所要求。在这里，使用矿物填料也有诸多好处。

Polypropylene

Polypropylene is used in a wide variety of applications. It is processed by injection moulding into parts for electrical engineering, automotive engineering and household appliances, as well as by extrusion into fibres and films. In the automotive industry, these compounds are used to make large parts such as side sills, door sills and interior trim.

Polyamide

Polyamide 6 and polyamide 66 are the most widely used engineering plastics worldwide. They are used because of their high heat resistance, high hardness and stiffness. In addition, polyamide 6 has good damping properties. The use of mineral fillers can positively influence the mechanical properties due to their different specific characteristics such as morphology, hardness or surface properties and thus offers an interesting spectrum of new possibilities.

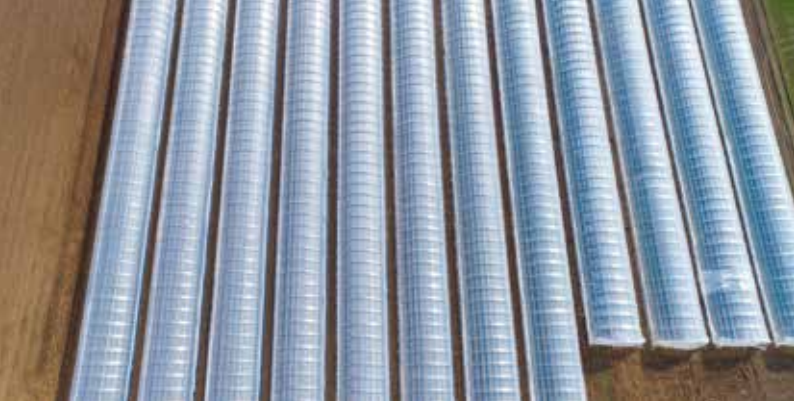
Polyethylene

Whether as packaging for food, in vehicle construction, in medical technology, on buildings for thermal insulation or in agriculture: polyethylene films are used in various areas of application and must meet the corresponding requirements. In addition to mechanical properties, optical requirements such as transparency, gloss or opacity are often added. Here, too, the use of mineral fillers can offer many advantages.



针对热塑性塑料的高性能填料 | *high-performance fillers for thermoplastics*

产品系列 <i>product line</i>	特性 <i>properties</i>						
	密度 <i>density</i> [g/cm³]	莫氏硬度 <i>Mohs hardness</i>	pH 值 <i>pH-value</i>	热膨胀系数 <i>coefficient of thermal expansion</i> [10 ⁻⁶ /K]	化学惰性 <i>chemically inert</i>	补强性能 <i>reinforcing properties</i>	
TREMIN®283 硅烷化硅灰石(低长径比) <i>wollastonite silane treated (LAR)</i>	2.85	4.5	10	6	■	■	
TREMIN® 939 硅烷化硅灰石(高长径比) <i>wollastonite silane treated (HAR)</i>	2.85	4.5	10	6	■	■	
Chinafill, 高岭土 TEC 高岭土 <i>kaolin</i>	2.60	2	5-7	5	■	■	
TIKRON® 滑石 <i>talc</i>	2.80	1	10	4	■	■	
TREFIL® 1232 硅烷化金云母 <i>phlogopite silane treated</i>	2.80	2-2.5	9.5	27	■	■	
TREMICA® 硅烷化白云母 <i>muscovite silane treated</i>	2.85	2.5	9.5	7	■	■	
SILATHERM® 导热填料 <i>thermally conductive fillers</i>	取决于类型 <i>depends on type</i>					■	
MICROSPAR® 长石 <i>feldspar</i>	2.60	6	10	–	■		
TREFIL® 无水石膏 <i>anhydrite</i>	3.00	3	9	–			
SIKRON® 石英细粉 <i>micronised silica flour</i>	2.65	7	7	14	■		
SIKRON® 方石英细粉 <i>micronised cristobalite flour</i>	2.35	6.5	8.5	54	■		



聚合物 <i>polymers</i>	优势 <i>advantages</i>	
聚酰胺、PBT、PSU、PPS <i>polyamide,PBT, PSU, PPS</i>	高冲击性和出色的尺寸稳定性 <i>high impact strength and excellent dimensional stability</i>	
聚酰胺、聚丙烯 <i>polyamide, polypropylene</i>	高耐刮擦性、高耐热性、高抗冲击性、优异的涂料附着力、用于零间隙设计的低收缩率 <i>high scratch resistance, high heat deflection, high impact strength, outstanding paint adhesion, low shrinkage for zero gap design</i>	
聚酰胺 <i>polyamide</i>	增强的抗拉强度和拉伸模量、出色的阻燃性能、优异的性价比 <i>Increased tensile strength and modulus of elasticity, effective flame retardance, excellent cost effectiveness</i>	
聚酰胺、聚丙烯 <i>polyamide, polypropylene</i>	良好的抗冲击性、成核剂 <i>good impact resistance, nucleating agent</i>	
聚酰胺 <i>polyamide</i>	用于易变形、深色、大型零件 <i>distortion sensitive, dark, large parts</i>	
聚酰胺 <i>polyamide</i>	用于易变形、浅色、大型零件 <i>distortion sensitive, bright large parts</i>	
聚酰胺、聚丙烯 <i>polyamide, polypropylene</i>	导热率增加 <i>increased thermal conductivity</i>	
聚乙烯 <i>polyethylene</i>	低雾度、良好的抗粘连性、高透射率 <i>low haze, good antiblocking values, high transmission</i>	
聚乙烯 <i>polyethylene</i>	良好的抗粘连性 <i>good antiblocking values</i>	
聚乙烯 <i>polyethylene</i>	薄膜、防粘连添加剂、深色 <i>films, antiblocking additives, dark colors</i>	
聚乙烯 <i>polyethylene</i>	薄膜、防粘连添加剂、浅色 <i>films, antiblocking additives, bright colors</i>	



热固性塑料 *thermosets*

高性能填料在热固性塑料的生产中起着重要的作用。对热固性塑料的高要求（例如高强度和耐高温性）只能通过功能性填料来满足。此外，在成品零件中使用它们可获得外观优良、耐腐蚀的表面。

High-performance fillers play an outstanding role in the production of thermoset plastics. High demands placed on thermosets, such as high strength and high temperature resistance, can only be met by functional fillers. In addition, their use in the finished parts leads to optically demanding, resistant surfaces.

用于电气工程的环氧树脂

几十年来，环氧树脂由于其良好的粘合性、良好的耐热性和耐化学性以及出色的电气性能一直是电气工程和电子产品的重要原材料。在电子产品中，环氧树脂模塑材料被用作涂覆体系、电路层压树脂和印刷电路板生产的辅助材料。在电气工程中，环氧树脂被用于转换器以及绝缘子和干式变压器的生产。

环氧树脂的机械、热和电特性在很大程度上取决于所选的功能性填料。

Epoxy resins for electronic engineering

Due to their good adhesion, good heat and chemical resistance as well as excellent electrical properties, epoxy resins have been an important raw material for electrical engineering and electronics for decades. In electronics, epoxy resin moulding materials are used as coating systems, laminating resins for circuits and auxiliary materials for printed circuit board production. In electrical engineering, epoxy resins are used in converter construction and for production of insulators and dry transformers.

The required mechanical, thermal and electrical characteristics of epoxy resins are largely determined by the selected functional filler.



数十年来，我们的填料在 EP 树脂体系中得到了广泛的应用。一方面，它们具有出色的机械性能，另一方面，它们也非常具有成本效益。特别是 SILBOND® W 12 EST，长期以来一直是耐候性户外应用的理想选择。如今，SILBOND® 石英粉也越来越多地用于室内浇铸树脂零件。具有最佳粒度分布的 SILBOND® 126 EST 可在相同粘度下获得更高的填充度。

在电气工程中，EP 浇铸材料和金属材料受到很大的热交变应力。为了避免损坏组件，不同材料随温度变化的尺寸必须尽可能保持一致。使用精选的 SILBOND® 熔融石英粉可最大程度地减少浇铸材料和金属之间因温度引起的不同尺寸变化，从而可制造复杂的零件并防止开裂。我们还为更高的填充度提供了粒径优化型 SILBOND® FW 126 EST。

我们的产品在环氧树脂应用中有以下特性：

- 改善耐候性和耐化学性
- 良好的机械强度
- 出色的可加工性
- 低热膨胀
- 更小的收缩率
- 高填充度

For decades, our fillers have proven their worth in EP resin systems. On the one hand, they are used for their outstanding mechanical properties and, on the other, they make an important economic contribution. SILBOND® W 12 EST in particular has long been the standard for weather-resistant outdoor applications. Today, SILBOND® silica flours are also increasingly used for „indoor casting resin parts“. The type SILBOND® 126 EST with an optimised particle size distribution is recommended for even higher filling degrees with the same viscosity.

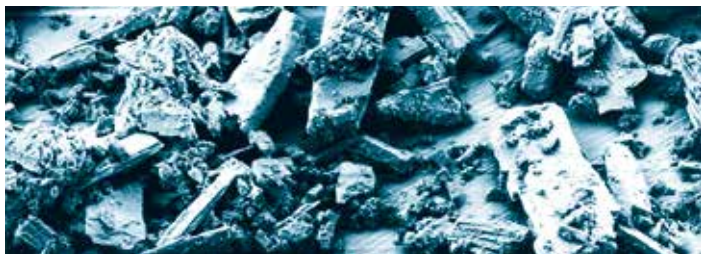
EP casting compounds and the metallic material are exposed to strong thermal alternating stress in electrical engineering. To avoid damage to the component, the temperature-related dimensional changes of the different materials must be as constant as possible. The use of selected SILBOND® fused silica flours minimises the different temperature-induced dimensional changes between casting compound and metal, enables the manufacture of complex components and prevents cracking. Here, too, we offer the package-optimised grade SILBOND® FW 126 EST for higher filling levels.

All our products offer the following properties in epoxy resin applications:

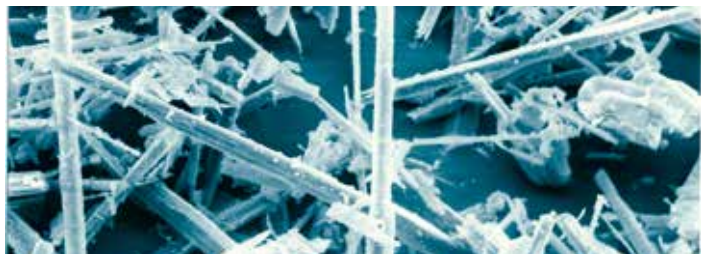
- improved resistance to weathering and chemicals
- good mechanical strength
- excellent workability
- low thermal expansion
- reduced shrinkage
- high filling levels

热固性塑料中高性能填料的性能
Properties of High Performance Fillers in thermosets

	MILLISIL®	SILBOND®	SILBOND®	TREMIN®	SILATHERM®	SILATHERM® Plus
	石英 silica		熔融石英 fused silica	硅灰石 wollastonite	导热填料 thermally conductive fillers	
机械强度 mechanical strength	+	++	++	+++	+	+
耐候性 weather resistance	+	+++	+++	-	+	+
耐化学性 chemical resistance	+++	+++	+++	-	++	++
SF6 惰性 SF6-resistance	--	--	--	--	--	--
填充度 filling degree	++	++	++	--	+	++++
可加工性 processibility	++	++	++	-	++	+
热膨胀 thermal expansion	+	+	+++	++	++	++
导热率 thermal conductivity	+	+	-	++	+++	++++



TREMIN® 283



TREMIN® 939

适合特殊要求的高性能填料 *High Performance Fillers for special requirements*

具有补强性能的 TREMIN® 硅灰石

硅灰石是一种具有补强和出色机械性能的矿物。长针型硅灰石（TREMIN 939®）具有出色的抗冲击性。因此，硅灰石粉末非常适合用于易裂型应用。

有两种不同的产品系列可供选择：块状 TREMIN® 283（LAR）和针状 TREMIN® 939（HAR）。硅灰石填料具有以下特征：

- 良好的电学特性
- 低热膨胀
- 优异的补强性能

TREMIN® wollastonite with reinforcing properties

Wollastonite is a reinforcing mineral with very good mechanical properties. Long needled wollastonite types, (TREMIN 939®) are characterised by excellent impact resistance. Wollastonite flours are therefore ideally suited for use in crack sensitive applications.

Two different product ranges are available: the block-shaped TREMIN® 283 (LAR) and the needle-shaped TREMIN® 939 (HAR). The wollastonite fillers are characterised by the following features:

- *good electrical properties*
- *low thermal expansion*
- *excellent reinforcing properties*



用于阻燃的 HYDRAFIL® 氢氧化铝

在拜耳工艺中，氢氧化铝由铝土矿制成。氢氧化铝的突出特点是其优良的阻燃性能、高白度和低硬度。HYRAFIL® 744 产品在环氧树脂体系中得到了广泛的应用。

HYDRAFIL® Aluminiumhydroxide for flame retardance

Aluminium hydroxide is produced from bauxite in the Bayer process. The outstanding features of aluminum hydroxide are its flame-retardant properties, its high whiteness and low hardness. The product HYRAFIL® 744 has already proven itself in epoxy resin systems.

HYDRAFIL® 744	
Al(OH) ₃	99.9 %
Na ₂ O	0.1 %
Fe ₂ O ₃	0.01 %
硬度 hardness (Mohs)	3
密度 density	2.4 g/cm ³
亮度 brightness	Y > 90
pH 值 pH-value	8

典型值 | typical values



有效的散热和电绝缘

Effective heat dissipation and electrical insulation

产品系列：SILATHERM®

自动化、网络和其他安全相关组件的 E&E 应用数量正在稳步增加。在大多数这些应用中，发热和散热问题对制造商构成了巨大挑战。借助塑料和填料的巧妙组合，可以开发技术上和经济上可行的替代金属的解决方案。

通过添加特殊的矿物填料，可以显著提高塑料的导热性。它们还使热固性体系具有更好的机械强度以及热和介电性能。

对于铸造材料领域，有各种 SILATHERM® 产品可供选择。

Product family: SILATHERM®

The number of E&E applications with regard to automation, networking and other safety-relevant components is constantly increasing. In most of these applications, the issue of heat generation and its effective dissipation poses a major challenge. A clever combination of plastics and fillers can be used to develop technically and economically viable alternatives to metal solutions.

Thermal conductivity of plastics can be significantly increased by adding special mineral fillers. They also give thermoset systems better mechanical strength as well as thermal and dielectric properties.

Various SILATHERM® types are available for the area of casting compounds.



性能范围

除导热性外，填料对其他特性也有很大影响。随着填料含量的增加，导热性不成比例地增加。同时，导热塑料的可加工性降低。因此，在挑选导热塑料时，必须在导热性、可加工性和材料成本之间做出取舍。

与其他材料一样，在开发之初必须考虑、权衡和斟酌其优缺点。只有这样，才能最佳利用材料的主要优势。

优势一览

- 导热性显著提高
- 电绝缘
- 与聚合物基质的良好融合
- 高填充度下的出色可加工性
- 增强的各向同性、抗热变形性和抗翘曲性
- 定制产品
- 全球供应和高性价比

Performance spectrum

In addition to thermal conductivity, fillers also have a strong influence on other properties. With increasing filler content, the thermal conductivity increases disproportionately. At the same time, the processability of the thermally conductive plastic decreases. Thus, when selecting a thermally conductive plastic, a compromise must always be made between thermal conductivity, processability and material costs.

As with other materials, the advantages and disadvantages must be considered, weighed and taken into account at the beginning of a development process. Thus the main advantages can be used optimally.

Advantages at a glance

- *significant increase in thermal conductivity*
- *electrical insulation*
- *excellent connection to the polymer matrix*
- *outstanding processability despite high filling*
- *increased isotropy, heat distortion resistance and warpage resistance*
- *customised product adaptations*
- *worldwide availability and good price/performance ratio*

用于特殊应用的高性能填料
High Performance Fillers for special applications

制动摩擦片

我们的长针型硅灰石产品 TREMIN® 939 为制动摩擦片带来了以下优势：

- 减少磨损
- 降低噪音
- 更低的振动水平
- 更高的制动稳定性
- 均匀磨损
(平滑的摩擦系数曲线)
- 尤其是提高了生坯的机械强度

磨料

在磨料领域，酚醛树脂主要用于砂轮、切割轮等的金属精加工和用作砂纸的粘合剂。我们的优质高岭土和碳酸钙非常适合这些应用。另外，通过使用碳酸钙可以优化各个晶粒之间的距离。而高岭土则适用于基于尿素的磨料。

PUR-RRIM 应用

长针型硅灰石 TREMIN® 939 为 PUR-RRIM 汽车零件带来了以下决定性的优势：

- 高抗拉强度
- 良好的光学性能
- 出色的高光泽可涂漆性

使用正确的 TREMIN® 939-304 剂量，可以根据需要调节杨氏模量。

Brake pads

Our long needled wollastonite Products TREMIN® 939 achieve the following benefits in brake pads:

- *reduction of abrasion*
- *lower degree of noise*
- *lower degree of vibration*
- *higher stability of the brakes*
- *leveling of abrasion*
(low spread angle of the friction coefficient course)
- *mechanical hardness increase of the green bodies in particular*

Abrasives

In the abrasives segment, phenolic resins are primarily used for metal finishing i. e. grinding wheels, cut-off wheels and as binding agents for sandpaper. In these applications, our high-quality kaolins and calcium carbonats are used. In addition optimise distances between the individual grains is achieved by the use of calcium carbonate. Kaolin, however, can also be used in urea linked abrasives.

PUR-RRIM applications

Long needle-shaped wollastonite TREMIN® 939 provides in automotive parts produced with PUR-RRIM the following decisive benefits:

- *high tensile strength*
- *good optical properties*
- *excellent ability for high-gloss varnishing*

With the right dosage of TREMIN 939-304 a perfect e-modulus can be adjusted.





弹性体 *Elastomers*

弹性体是一种尺寸稳定但可变形的弹性聚合物，例如含氟弹性体或硅胶。这些聚合物被广泛用于需要高弹性的最终产品（例如密封圈、轮胎、电缆、软管、传送带、地板面层）以及医疗技术中。高性能填料为改善机械和电气性能提供了广泛的可能性。另外，它们还使弹性体具有良好至非常好的着色性能。

Elastomers are dimensionally stable but elastic deformable polymers such as fluoroelastomers or silicones. These polymers are used wherever the high elasticity of the end product is important, e. g. in sealing rings, tyres, cables, hoses, conveyor belts, floor coverings and in medical technology. High-performance fillers offer a wide range of possibilities for improving mechanical and electrical properties. In addition, they allow good to very good colorability of the elastomer.

含氟弹性体

含氟弹性体是一种非常专业的材料，适用于发动机和机械制造以及化工厂中的苛刻应用。它们可为高温应用，特别是腐蚀性化学品提供密封件。

多年来，经过硅烷化处理的短针型灰石粉被成功用作含氟弹性体的功能性填料，以便调节硬度。在含氟弹性体中，我们的TREMIN® 283产品不仅具有良好的补强效果，而且还具有可着色、浅色化合物的优势。用TREMIN® 283优化的含氟弹性体非常适合特殊条件（例如高机械应力）下的应用，并具有以下优势：

- 出色的尺寸稳定性
- 非常好的着色性
- 高抗撕裂强度
- 低摩擦系数
- 更高的抗拉强度
- 改善的耐化学性
- 更高的耐温性

橡胶

橡胶作为一种极富弹性的材料，已成为我们日常生活中不可或缺的一部分。橡胶是硫化的天然或合成橡胶。橡胶被广泛用于需要高弹性的地方，例如轮胎、地板面层、软管、电缆和传送带或各种家用产品中。通过添加 CHINAFILL 高岭土，可在橡胶应用中获得以下性能：

- 优异的抗拉强度
- 高抗撕裂强度
- 更高的杨氏模量
- 非常好的着色性
- 改善的电缆电绝缘性能

Fluoroelastomers

Fluoroelastomers are highly specialised materials for the most demanding applications in engine and mechanical engineering as well as in chemical plant construction. They make seals for high-temperature applications and particularly aggressive chemicals possible in the first place.

Our short needle wollastonite flours have been used successfully for many years as functional fillers in fluoroelastomers for example to adjust hardness. In fluoroelastomers, our TREMIN® 283 products offer not only good reinforcement but also the advantage of colorable, light-colored compounds. Fluoroelastomers optimised with TREMIN® 283 are ideal for applications under special conditions such as high mechanical stress and offer the following advantages:

- *excellent dimensional stability*
- *very good colorability*
- *high tear resistance*
- *low friction coefficient*
- *increased tensile strength*
- *improved chemical resistance*
- *higher temperature resistance*



Rubber

Rubber has become indispensable in our everyday lives as an extremely ductile material. Rubber is vulcanised natural or synthetic rubber. Rubber polymers can be found where elasticity is particularly important, e. g. in tyres, floor coverings, hoses, cables and conveyor belts or in various household products. By adding kaolin types CHINAFILL, the following properties are achieved in rubber applications:

- *excellent tensile strength*
- *high tear resistance*
- *increased modulus of elasticity*
- *very good colorability*
- *increased electrical insulation properties in cables*

硅胶

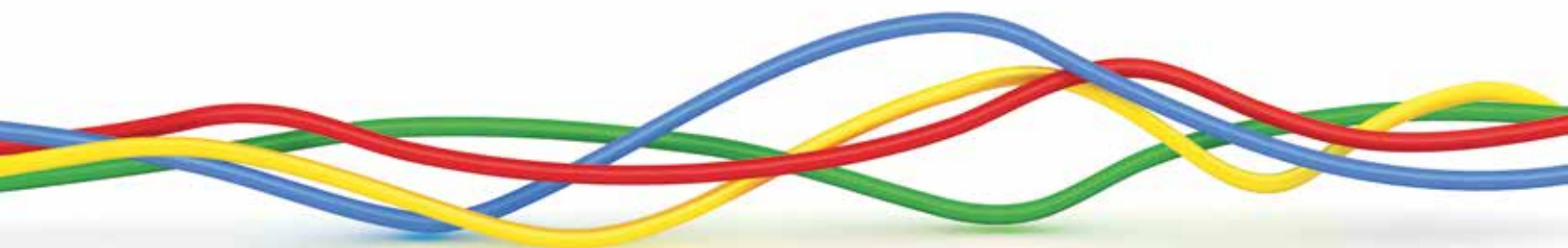
硅胶是一种具有特殊性能的弹性体：它极具弹性、非常耐热、疏水且具有高介电强度。与常规橡胶不同，硅胶可以在很宽的温度范围内保持其性能。因此，硅胶被广泛用于制造高热应力应用中的密封件、绝缘材料和模制零件，已成为医疗技术、电子工业和家用领域不可缺少的一部分。优质的石英和方石英粉已被证明在硅胶中具有很高的价值。在硅树脂中使用SIKRON®和SILBOND®可获得以下性能：

- 可调的弹性或肖氏硬度
- 可调的热膨胀
- 非常好的着色性
- 改善的电绝缘性能
- 更小的收缩率

Silicone

Silicone is an elastomer with special properties: it is extremely elastic, very heat-resistant, hydrophobic and has a high dielectric strength. Unlike common rubber, silicones retain their properties over a wide temperature range. Silicones are therefore used for gaskets, insulations and moulded parts subject to high thermal stress and are indispensable in medical technology, the electronics industry and the household. Especially fine silica and cristobalite flours have proven themselves in silicone. The following properties are achieved by using SIKRON® and SILBOND® in silicones:

- *adjustable elasticity or Shore hardness*
- *adjustable thermal expansion*
- *very good colorability*
- *increased electrical insulation properties*
- *reduced shrinkage*



推荐用于密封件和电缆

SIKRON® SF 600 石英细粉或经表面处理的SILBOND® 600 TST或SILBOND® 600 RST系列特别适用于密封件和电缆。对填料进行表面处理可确保在硅胶的加工过程中具有低粘度。通过添加这类填料，可以有针对性地调节硅胶零件的电气和机械性能（例如，提高电绝缘性能）。

Recommendations for seals and cables

SIKRON® SF 600 silica powders or the surface-treated variants SILBOND® 600 TST or SILBOND® 600 RST are particularly suitable for seals and cables. Surface treated fillers ensure low viscosity during silicone processing. By using these fillers, the electrical and mechanical properties of the silicone part can be specifically influenced (e.g. increase in electrical insulation behaviour).

有机硅灌封胶的导热性

柔软、导热的弹性体特别适合用于将散热片或印刷电路板上的发热甚至发烫的电子组件与相邻的金属外壳连接。SILATHERM®适合用于导热有机硅灌封胶应用。方石英粉适用于牙模材料的硅胶中。在这里，我们特别推荐使用硅烷化的SILBOND®。

Thermal conductivity of silicone encapsulants

The soft, thermally conductive elastomers are particularly suitable for connecting warm or even hot electronic components on heat sinks or printed circuit boards with adjacent metal housings. Suitable SILATHERM® grades are available for use in thermally conductive silicone encapsulants. Cristobalite flours are preferably used in silicone for dental impression materials. Here we generally recommend the silanised SILBOND® grades.



牙模材料

Dental impression materials

选择正确的填料可以在所需的印模材料粘度下获得很高的填充度。以这种方式，可以通过最小化反应收缩率来实现最大的压印精度。极白的方石英可使印模材料具有出色的着色性和所需的弹性或肖氏硬度。

The correct selection of fillers enables a very high degree of filling with the desired viscosity of the impression materials. This allows the greatest possible precision of the impression to be achieved by minimising reaction shrinkage. The very white cristobalite allows excellent colorability and the desired elasticity or Shore hardness of the impression materials.

极低的粗粒率

此处列出的所有石英或方石英细粉均包含极低比例的粗颗粒。它们决定了应用的功能。粗颗粒会导致化合物的微观结构不均匀，并极大地损害密封性能或电绝缘性能，因此对牙模材料带来负面影响。

Extremely low proportion of coarse particles

All silica and cristobalite fine flours listed here contain an extremely low proportion of coarse particles. This is decisive for the functionality of applications. Coarser particles would greatly impair the sealing properties or the electrical insulating properties as inhomogenities in the microstructure of the compound, but would of course also lead to negative effects in dental impression materials.

通过根据各种应用对矿物填料进行有针对性的表面改性，可以在聚合物体系或最终零件中实现以下性能：

- 高耐候性和耐化学性
- 高机械强度
- 更高的杨氏模量
- 更高的填充度
- 优异的可加工性

关于何种表面修饰能为某种聚合物提供最佳结果的问题，最可靠的是通过实验获得答案。

With a specific surface treatment of mineral fillers, attuned to the polymer system, the following features are achieved:

- *high weathering and chemical resistance*
- *high mechanical strengths*
- *increased tensile modulus*
- *enhanced filling degree*
- *excellent processability*

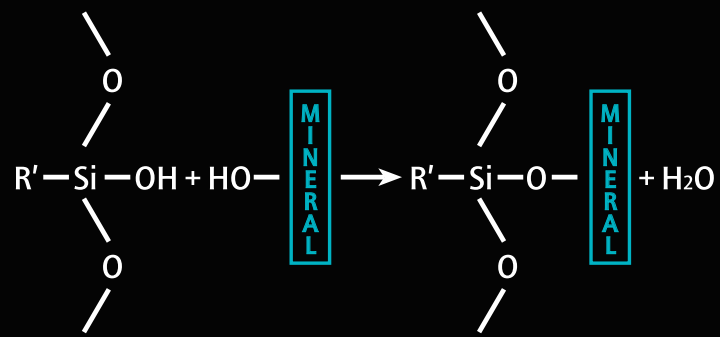
The most reliable way to find out which coating produces the best results for a specific polymer is by experiment.

矿物填料的硅烷化处理

Silanisation of mineral fillers

应用推荐 | Recommended application

聚合物体系 polymer systems	产品标识 labelling
EP、EPDM、FA、MF、PA、PC、PE、PF、PP、PUR、PVC、UF、 聚砜 polysulfone, 水性分散体系 aqueous dispersions	- AST
ABS、EP、MF、UP、SAN、PA、PC、PE、PF、PP、PS、PUR、PVC、 醇酸树脂 alkyd resins, 多硫化物 polysulfide, 水稀释的体系 water-dilutable systems	- EST
EP、PE、PMMA、PP、PS、SAN、UP	- MST
硅橡胶 silicone rubber	- RST / - TST
EPDM、EPM、EPT、PDAP、PE、PP、SBR、UP	- VST



矿物表面的硅烷化反应
Silan reaction at the surface of the mineral



定制解决方案

我们很乐意根据客户的要求和目的生产特定产品。此外，我们可随时为您提供不同粒度的样品，以便您进行实验室测试。请联系我们！

Tailor-made solutions for you

We are happy to manufacture special products for your specific needs and application and provide you with small samples free of charge for trials. Please do not hesitate to contact us!

我们的一些产品根据欧洲 CLP 法规 (EC/1272/2008) 被划分为 STOT RE 1 类或 2 类。详情请参阅相应的材料安全数据表。本应用报告中的数据在我们的认知范围内收集和编写。但是，我们要求大家理解，我们不为个别情况的结果以及建议的适用性和完整性承担责任，也不保证未侵犯任何第三方专利权。此处使用符号 ® 表示相关商标已在一个或多个（但不是全部）国家/地区注册。如有任何问题，欢迎向我们咨询。在含高岭土的纸上印刷。

Some of our products are classified into the STOT RE cat.1 or 2 according to the European CLP Regulation (EC/1272/2008). More detailed information is available from the respective material safety data-sheet. The figures documented in this application technique report were collected and shown to the best of our knowledge. However, we ask for understanding that we cannot take over liability for the results in individual cases and for the suitability and completeness of our recommendations, and cannot guarantee that no third-party patent rights are restricted. The use of the symbol ® herein signifies the registration of the associated trademark in one or more, but not all, countries. We are available for further questions and consultation. Printed on paper containing kaolin.

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