INDUSTRY BROCHURE 315

AEROSIL® SIPERNAT® ZEOFREE®

Silicas and Silicates designed for the Food Industry

EVONIK
Leading Beyond Chemistry

WHAT CAN EVONIK SILICAS AND SILICATES DO FOR YOU?

At Evonik, we understand the headaches associated with manufacturing powdered food products. Caking and lumping can create serious problems during production, processing, dosing, storage and customer use. Additionally, caking and bad flowability can cause unnecessary product loss and requires a lot of water, and energy for cleaning of equipment. Evonik has solved these problems for hundreds of customer applications with its outstanding lineup of high-performing silica and silicate products. Through advanced product technology and custom application development, Evonik stands ready to remedy your issues today.

80% of all food products have components produced in a dry state at some point of their processing.[1] Due to their fine particle size or stickiness, some powders show poor flow properties and cake upon storage which makes handling and proper dosing difficult. Hygroscopic substances such as fruit powders, table salt, vegetable extracts, and spice mixtures, are a few of many examples. For all those ingredients, ZEOFREE®, SIPERNAT® precipitated and AEROSIL® fumed silica offer an efficient low-cost way to meet this challenge and improve sustainability.

1) Burgain, J. et al. (2017). Surface chemistry and microscopy of food powders, Progress in Surface Science 92(4) 409-429.

SUSTAINABILITY

- Extended storage stability
- Less food waste
- Less wastewater
- Reduced downtime in production

ENJOYMENT & CONVENIENCE

- Consistent quality & taste
- Exact & easy dosing
- Reliable vending machines that work all day long
- No clumps for the consumer

HEALTH

- Exact dosage of actives & nutrients in nutraceuticals
- Accessibility of a wide range of active ingredients

BENEFITS FOR YOU AND FOR YOUR CUSTOMER

- Improved flowability
- Reduced caking tendency
- Exact dosing
- Constant quality
- Less off spec material
- Less food waste and production loss
- Improved storage stability
- Increased productivity
- Less cleaning downtime and less resources lost by cleaning
- Cost savings
- Improved sustainability in your process and throughout the whole value chain
- Food grade silica quality

HOW DO EVONIK SILICAS AND SILICATES WORK?

While Evonik produces a broad range of silica and silicate products for powdered food applications, the general approach to solving caking and lumping problems is as follows:

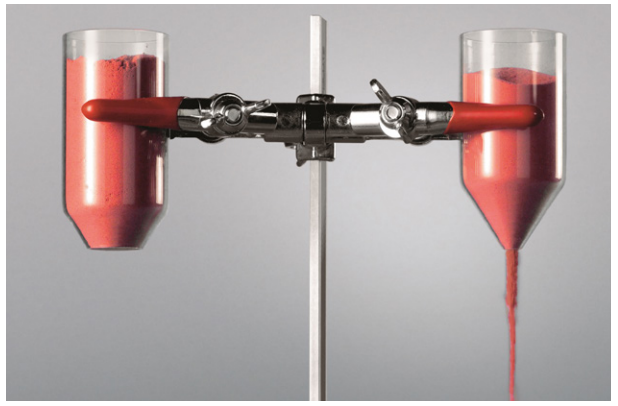
- Coating the surface of powder, thereby reducing interparticle interactions
- Interspersing and preventing interparticle interactions
- Absorbing moisture to prevent bridging between particles
- Absorbing fats and oils to prevent non-aqueous bridging between particles

ZEOFREE®, SIPERNAT® and AEROSIL® products help to dose powdered ingredients easily and accurately

When used in industrial processes, powdered ingredients, such as spice mixtures, fruit powders, and table salts usually are added by automated dosing systems. For the quality of the food ingredient, a constant and accurate dosing is crucial. Poor powder flowability will lead to erratic dosing and unsatisfactory quality of the final product.

As a manufacturer of powdered ingredients, you can help your customer, whether in the production plant or cooking at home, to make dosing easier. Evonik Silica and Silicates improve the flowability of your products. They act as flow aids by covering the surface of powder particles, thus, spacing them apart. An additional advantage is their large absorption capacity, which enables them to take up moisture or oil from the powder surface and reduce stickiness considerably. When choosing the right silica, particularly AEROSIL®, the color of your product remains unchanged.

ZEOFREE®, SIPERNAT® and AEROSIL® products help to spray dry your products



Fruit powder without (left) and with (right) addition of silica

Many food ingredients are spray dried. Some examples are vegetable powder, whey powder, egg powder, or coffee creamer. During production, caking can occur on the inner wall of the spray dryer, which makes regular cleaning necessary. The addition of ZEOFREE®, SIPERNAT® or AEROSIL® directly into the spray tower, separately from the slurry, reduces the caking and minimizes expensive downtime and resources wasted for cleaning. Furthermore, this addition saves a mixing step and increases your throughput. This is the most efficient way to reduce food waste by applying silica as a flow- and anti-caking aid.

ZEOFREE®, SIPERNAT® and AEROSIL® products as a milling aid

Milling is widely used in various industries, for example, when processing spice and seasoning blends or low melting point powdered foodstuff. Due to their content of water, oil or fat, the handling of such kind of products while milling can cause problems like adhesion in the mill or lumping of the product that leads to clogging. Furthermore, a free-flowing powder is desired, but may not possible without the addition of Evonik Silica and Silicates.

These highly efficient milling aids offer a number of benefits. Besides quality improvements such as better flowability and reduced caking tendency, AEROSIL®, SIPERNAT® and ZEOFREE® products are able to improve the milling process with regards to the throughput, helping to keep the mill clean by absorbing any released liquid immediately. Thus, their addition leads to a reduced number of cleaning intervals resulting in a tremendous cost and resource-saving effect. AEROSIL®, ZEOFREE® and SIPERNAT® products can be applied for example in hammer mills, pin mills or alike and can be dosed directly into the mill respectively in a post mixing step after milling or in a pre-mixing step before milling.

ZEOFREE®, SIPERNAT® and AEROSIL® products help to avoid caking during transport and storage

As a producer of ingredients, you ship your products throughout the world and store them under different climate conditions. Varying temperature and humidity during transport and storage may lead to caking of your products, which makes it more difficult for your customer to process. The addition of SIPERNAT®, ZEOFREE® or AEROSIL® products helps to avoid such agglomerates efficiently, enabling you to deliver a consistent product quality to every place of the world.

ZEOFREE®, SIPERNAT® and AEROSIL® products help the consumer of powdered food products

Powdered food products, like instant beverages or soup powders, play an increasingly important role for the consumer. It is desirable that these powders flow freely, do not cake, and are easy-to-disperse in water. SIPERNAT®, ZEOFREE® and AEROSIL® improve those properties considerably; especially powdered drinks in vending machines are exposed to steam permanently which leads to caking easily. It is the high absorption capacity of some ZEOFREE®, SIPERNAT® and AEROSIL® products which helps to maintain the flowability of the treated powders even in this challenging environment. This helps to reduce unnecessary food waste.

FORMULATION TIPS

- Evonik Silicas and Silicates must be blended carefully with the powdered food product; metering equipment should be used, and care taken to ensure the product is well-blended
- Selecting the proper particle size anti-caking agent can reduce dusting; particles that are too large relative to the host cannot adhere to the host and thus create dust; the use of excessive amounts of anti-caking agent beyond what is needed to coat the surface of the host can result in dust
- In many applications, the Evonik Silica or Silicate can be added to the dryer to ensure good contact with the substrate

RECOMMENDED PRODUCTS

The following table summarizes some of the most important applications and the recommended SIPERNAT®, ZEOFREE® and AEROSIL® products. The recommendations are valid for typical products within the respective group; individual products may behave differently.

Additional products may be available in your region.
We are happy to answer your questions in detail and assist you in choosing the right product for your individual application as well as in handling and processing our products.

Typical applications and recommended products

FOOD APPLICATION

		Bake mix	Brewer's Yeast	Cane Sugar	Dairy powder	Drink Mix	Emulsifiers	Hydrolyzed protein powder	Icing sugar	Instant Soups & Bouillon	Minerals	Non-Dairy Creamer	Nutraceuti-cals	Powdered Egg	Salt	Spice & Seasonings	Sugar Substitue	Tomato Powder
Synthetic amorphous silicon dioxide	**AEROSIL® 200 F**	+			+	++		+	+				+	+		+		++
	AEROSIL® 380 F															+		++
	SIPERNAT® 22 S SIPERNAT® 22 S F	+	+		+	+	+		+	+	+	++			+	++		
	SIPERNAT® 25				+	+				+	+	++				+		
	SIPERNAT® 340	+			+		+				+					+		
	SIPERNAT® 350				++		++		+			+						
	SIPERNAT® 50 S	+	+	+	+	++		+		+	+	++	+		++	++	++	+
	SIPERNAT® 37	+	+		+	+		+		+		+	+	+	+	+		+
	SIPERNAT® 45 S	+	+	+	+	+		+		+		+	+		+	++	+	+
	SIPERNAT® 680					+						++				+		
	SIPERNAT® 28	+	+	++		++		+	+	++	+	+	+		+	+	+	
	ZEOFREE® 80	+	+	+	+	+				+	++	+				+		
	ZEOFREE® 5162 ZEOFREE® 5162 Q	+	+	+	+	+	+			+	+	++		+		++		
Synthetic Calcium Silicates	**ZEOFREE® 5133**	+			+	+				+		++			+	+		
Synthetic Sodium Aluminosilicates	**SIPERNAT® 823 A**	+			+	+				+		++		+	+	+		
	SIPERNAT® 823 D	+			+	+				+		++		+				
	SIPERNAT® 807	+				+				+		+		++		+		

\+ Recommended ++ Especially recommended

Please check regional availability and regulatory status of each type individually before use!
For material, produced according to HACCP principles, please contact our responsible sales department.

Evonik: A partner you can depend on

Experience
Evonik has been solving the caking and lumping problems of powdered food producers for many decades.

High-performing products
Evonik offers a broad range of silica and silicate products designed specifically for powdered food products.

Custom application support
Evonik provides custom application development in our dedicated food technology laboratory to ensure the optimal solution is provided for our customers.

Quality
Evonik's production facilities are ISO certified and operate under HACCP or Good Manufacturing Practices (GMP).

Assurance of global supply
Evonik has many production facilities globally.

Evonik Silica – Your global partner Food additive certification

Several hydrophilic ZEOFREE®, SIPERNAT® and AEROSIL® products are approved as food additives E 551 (Silicon dioxide) or E 552 (Calcium Silicate) for many food applications in Europe. The purity criteria for E 551 and E 552 of Commission Regulation (EU) No 231/2012 laying down specifications for Food additives listed in Annexes II and III to Regulation (EC) No 1333/2008 are fulfilled. All corresponding products are in compliance with the HACCP manufacturing principles described in Regulation (EC) No. 852/2004.

Furthermore, several products are following the JECFA Monograph 20 (2017) for Silicon Dioxide, Amorphous (INS 551) or JECFA Monograph 17 (2015) for Calcium Silicate (INS 552).

In addition, several products are in compliance with the conditions stipulated under 21 CFR (US Code of Federal Regulations) §172.480 (silicon dioxide), §172.410 (calcium silicate) and §182.2727 (sodium aluminum silicate), the monograph for silicon dioxide, calcium or sodium aluminum silicate from FCC 12 (Food Chemical Codex) as well as FSMA-related principles (Food Safety Modernization Act). Silicon dioxide is considered generally recognized as safe per GRAS notification 00554 and sodium aluminum silicate according to §182.2727.

Beyond that, several silicon dioxide products are approved as food additives in China according to GB 25576-2020 and GB 2760-2014 (Food safety standard for the usage of food additives).

All Silica production sites manufacturing hydrophilic ZEOFREE®, SIPERNAT® and AEROSIL® products recommended as food additives have implemented food safety plans and system following the international food standard of Codex alimentarius which includes general Principles of Food Hygiene: Good Hygiene Practices (GHPs) and the Hazard Analysis and Critical Control Point (HACCP) System. As part of our HACCP concept, both Food Defense and Food Fraud are considered extensively.

Additionally, specific Evonik Silica sites all over the world are certified according GFSI recognized standards like BRC and FSSC 22000.

Details can be found in the Product Safety Information for each product. We are happy to provide Kosher and Halal certificates upon request.

Please contact your usual sales contact or more information

CHOLESTEROL-FREE · CRUELTY FREE* · GLUTEN FREE · NO CALORIES · KOSHER · VEGAN · HALAL

Types of Evonik specialty silica available for food per region include:

MOST FREQUENTLY USED EVONIK SILICA AND SILICATE TYPES

		EMEA	North America	Latin America	China	Rest of Asia
Synthetic amorphous silicon dioxide	AEROSIL® 200 F	●	●	●	●	●
	AEROSIL® 380 F	●	●	●	●	●
	SIPERNAT® 22 S SIPERNAT® 22 S F	●	●	●	● 22 SF	●
	SIPERNAT® 25	●	●	○	●	●
	SIPERNAT® 340	○	●	●	○	○
	SIPERNAT® 350	●	●	●	○	●
	SIPERNAT® 50 S	●	●	●	●	●
	SIPERNAT® 37	○	○	○	●	●
	SIPERNAT® 45 S	○	●	●	○	○
	SIPERNAT® 680	○	○	○	●	●
	SIPERNAT® 28	○	●	●	○	○
	ZEOFREE® 80	●	●	●	○	○
	ZEOFREE® 5162 ZEOFREE® 5162 Q	●	●	●	● 5162 Q	●
Synthetic Calcium Silicates	ZEOFREE® 5133	●	●	●	○	●
Synthetic Sodium Aluminosilicates	SIPERNAT® 823 A	○	●	●	○	○
	SIPERNAT® 823 D	○	●	●	○	○
	SIPERNAT® 807	○	●	●	○	○

● is available in the region ○ is not approved and/or available in the region

Please see our CARPLEX® products specifically to meet the Japanese food requirements. Additionally, there are many more products available regionally. Please contact your local sales representative to see our full portfolio and our new products.

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The Silica and Silanes experts at Evonik – From elements to excellence.

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