

WACKER

CREATING TOMORROW'S SOLUTIONS



PYROGENIC SILICA | COSMETICS

HDK[®]

Personal Care and Cosmetics Factbook



WELCOME TO THE WACKER FAMILY
OF PERSONAL CARE AND COSMETICS
PRODUCTS

APPLICATION FIELDS OF HDK® IN PERSONAL CARE AND COSMETICS

WACKER has been producing and refining its brand of HDK® pyrogenic silica for over 40 years. Our integrated manufacturing protocols, statistical process control and highly efficient reactor dynamics produce exceptionally pure grades of inorganic, pyrogenic silica. These grades are especially well-suited for personal care and cosmetics applications.

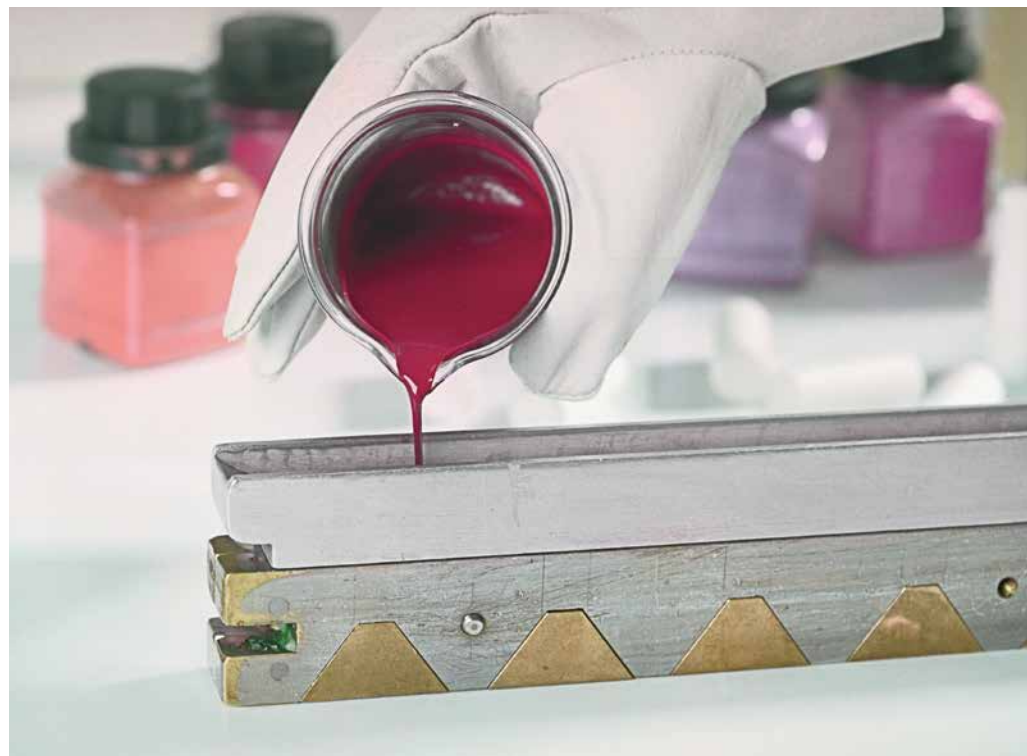
Fascinatingly Versatile

Although HDK® pyrogenic silica is an established and highly successful product, WACKER continues to push forward with its R&D to seek new potential solutions to further boost product performance

and quality. The exclusive selection of both hydrophobic and hydrophilic HDK® grades offers highly versatile and comprehensive solutions for a wide range of personal care and cosmetic applications.

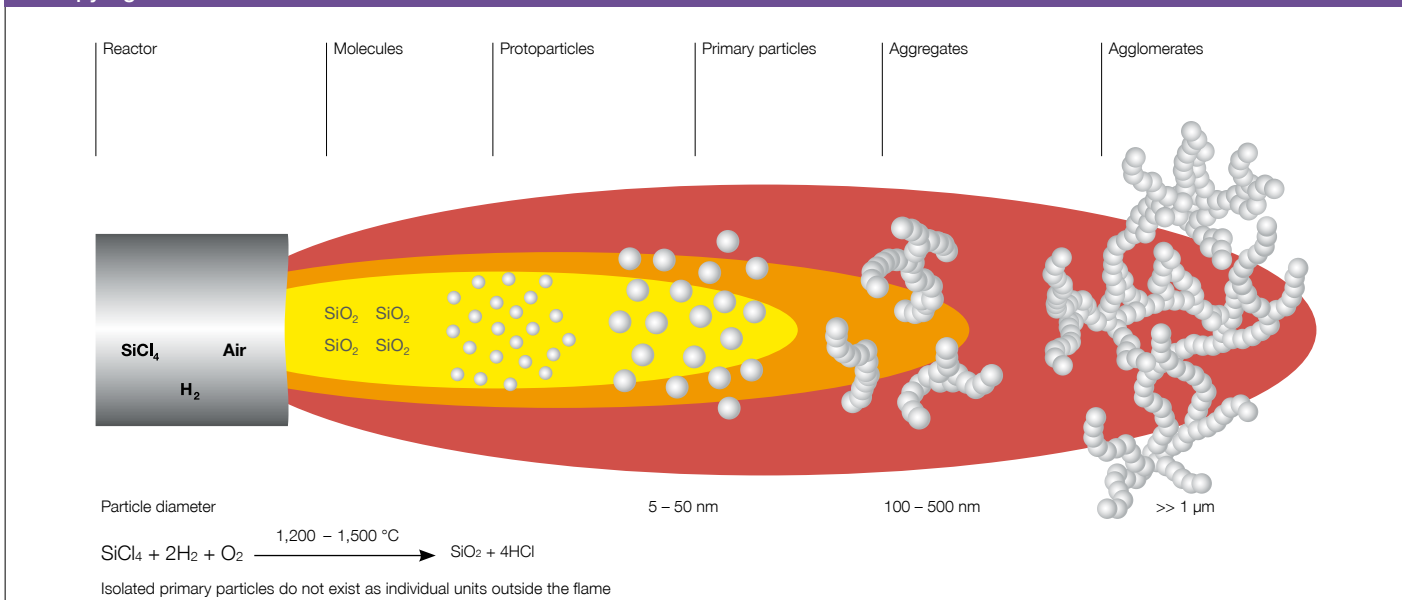
HDK® in Personal Care and Cosmetics

Lipstick/lip gloss	Up to 2 % by weight
Hair care products (bleach, dyes, shampoo)	Up to 4 % by weight
Creams and ointments	Up to 4 % by weight
Aerosol antiperspirants	Up to 8 % by weight
Pressed powders (make-up)	Up to 10 % by weight
Gels	Up to 7 % by weight
Nail varnish/lacquer	Up to 4 % by weight
Tooth pastes (gels)	Up to 10 % by weight
Foundations	Up to 6 % by weight
Creams/sun care	Up to 6 % by weight



THE BASIC PYROGENIC SILICA REACTION PROCESS – PURITY OF THE HIGHEST CLASS

HDK® pyrogenic silica – formation in a flame



HDK® is produced at multiple sites by an integrated, efficient and environmentally compatible process that saves energy and raw materials.

Hydrophilic HDK® with a Large Surface Area

The production parameters are responsible for the excellent properties of hydrophilic, pure and odorless HDK®.

Pyrogenic silica is formed by hydrolysis at over 1,000 °C. This is achieved by introducing chlorosilanes into an oxyhydrogen flame, producing SiO₂ primary particles about 5–50 nanometers (10⁻⁹ m) in size. In the flame, the primary particles fuse together permanently to form large units, or aggregates (100–1,000 nm in size). That is to say, individual primary particles only exist in the reaction zone itself.

On cooling, the aggregates mechanically entangle to form agglomerates, known as tertiary structures. The aggregates have sizes in the range of microns. HDK® has a very high specific surface area (BET) because of the small diameters of its primary building blocks. The primary particles that are fused together in the aggregates finally arrange themselves into agglomerates. This inherently large surface area-to-mass ratio causes intense interparticulate interactions, which are the result of attractive dispersion and dipolar forces. And that is precisely the reason for the outstanding properties of HDK®.

HDK[®] PYROGENIC SILICA PRODUCT RANGE

Standard Grades					
Specific Surface Area [m ² /g]	Hydrophilic HDK [®]		Hydrophobic HDK [®]		
	Undensed	Densed	Dimethylsiloxy	Trimethylsiloxy	Polydimethylsiloxy
~ 50	HDK [®] D05				
~ 100	HDK [®] C10	HDK [®] C10P			
~ 130	HDK [®] S13	HDK [®] S13P	HDK [®] H13L		
~ 150	HDK [®] V15	HDK [®] V15P	HDK[®] H15		HDK [®] H17
~ 200	HDK[®] N20, HDK [®] N20ST, HDK [®] N20 Pharma	HDK [®] N20P	HDK[®] H20	HDK [®] H20RM, HDK[®] H2000	HDK[®] H18
~ 300	HDK[®] T30	HDK [®] T30P	HDK[®] H30	HDK [®] H30RM	
~ 400	HDK [®] T40	HDK [®] T40P			

INCI Names of HDK [®] Products According to PCPC (former CTFA):				
INCI Names	HDK [®] Grades			
Silica	HDK[®] N20	HDK[®] T30		
Silica dimethyl silylate	HDK[®] H15	HDK[®] H20	HDK[®] H30	HDK[®] H18
Silica silylate	HDK[®] H2000			

Within the complete HDK[®] product portfolio, selective grades correspond to personal care and cosmetic application requirements.

HDK® – EXCELLENT AS A PERFORMANCE MODIFIER FOR OPTIMUM QUALITY

Standard Uses



Thixotropy

HDK® helps a liquid to reduce viscosity under the influence of shear and to recover viscosity when the shear is removed



Thickening

HDK® helps increase the viscosity of a liquid by its addition



Free-flow

HDK® helps in the movement of dry powders / particles by reducing the cohesion of particles



Anti-sag

HDK® helps a liquid or semisolid paste to remain where applied and to resist flow and levelling



Anti-settling

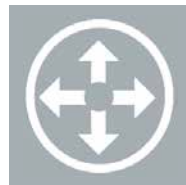
HDK® helps a liquid to have all of its components remain in suspension and not to striate or settle non-uniformly during shipment and storage



Flow and leveling

HDK® helps a liquid when applied to a surface to spread uniformly across the available space

Specialty Uses



Filler/diluent

HDK® helps as an inert ingredient in a formulation while expanding the space available for active ingredients



Lubricant

HDK® helps as a spacer to improve release properties and/or to separate materials during processing



Binder

HDK® helps maintain the structural strength of materials compacted during manufacturing



Glidant

HDK® helps enhance the uniform flow and mixing of materials



Sorbent

HDK® helps as a moisture scavenger to maintain and improve free flowability of the materials to which it is added

HDK® – CERTIFIED QUALITY

GRAS

Pyrogenic hydrophilic silica is generally regarded as safe material according to FDA § 182.90.

REACH compliance status

Herewith we confirm that HDK® is in compliance with the EC Regulation 1907/2006 (REACH).

HDK® was successfully registered in the “silicon dioxide” substance group according to the REACH regulation on the registration, evaluation, authorization and restriction processes for chemical substances. This was announced by the European Chemicals Agency ECHA in mid-March 2009.

Compliance Cosmetic Directive

HDK® complies with Regulation 1223/2009 (recast of the Cosmetic Directive 76/768/EC and all its amendments). The product neither contains any of the restricted compounds included in Annex III as per recipe nor are any CMR cat. 1 or 2 compounds intentionally introduced.

COLIPA

Herewith we confirm that we registered for HDK® H20 all uses listed on COLIPA's use mapping.

Food

Hydrophilic HDK® grades may be used as direct food additives in accordance with EU-Directive 95/2/EC.

Kosher

HDK® N20, HDK® T30, HDK® H15, HDK® H20, HDK® H18 grades are Kosher certified for use in Kosher milk and meat products.

Halal

Hereby it is certified that hydrophilic HDK® – which is approved for direct and indirect food contact according to the relevant Directives such as the German BfR Recommendation LII “Fillers”, the European Directive 2002/72/EC and the US Code of Federal Regulations (e.g. §173.340, §182.1711 and others) – meets the criteria of “Halal”. HDK® is a fully synthetic product that does not contain any “Haram” substances.

CONSISTENCY AND PURITY

Typical analytical data of HDK®			
Trace element impurities		Inorganic impurities	
Element	Measured levels (mg/kg)	Element	Measured levels (mg/kg)
Ag	< 2	K	< 2
Al	< 2	Mg	< 2
As	< 2	Mn	< 2
Ba	< 2	Mo	< 2
Bi	< 2	Na	< 2
Ca	< 2	Ni	< 2
Cd	< 2	Pb	< 2
Co	< 2	Sn	< 2
Cr	< 2	Sr	< 2
Cu	< 2	Ti	< 2
Fe	< 2	Zn	< 2
Ge	< 2	Zr	< 2
Hg	< 1		
Total	< 20		
		Cl	< 100

Standard tests:

- BET surface area
- Sieve residue
- pH in a 4 % aqueous dispersion

Typical general properties:

Tap density: approx. 40 grams/liter
 Loss on drying (2 hours at 105 °C): < 1.5 %
 SiO₂ content: > 99.8 %

Analytical methods for elements:

- Flame AES and ICP
- “<” indicates the detection limit has been reached

The figures are only intended as a guide and should not be used in preparing specifications.

PERFORMANCE PROPERTIES AND CHARACTERISTICS

HDK® pyrogenic silica has a wide variety of uses in cosmetics and personal care products. From lipstick to shampoo, HDK® pyrogenic silica can greatly help improve the versatility and performance of your products.

Effects

HDK® has wide uses in cosmetics and personal care products for its variety of specific properties.

Rheology control

HDK® increases viscosity and imparts thixotropy. As a gelling agent, HDK® modifies the viscosity of oils, waxes and emulsions.

Sedimentation and separation

HDK® delays or prevents settling of pigments and powders (in suspensions).

In creams, lotions, lipstick and foundation products, HDK® improves stability and structure.

HDK® stabilizes formulations by reducing sensitivity to temperature, electrolytes and pH.

Free-flow and anticaking additive

HDK® improves the free-flow of powders.

Applications

Color Cosmetics

In foundations, eyeliners and mascara, HDK® regulates consistency, controls viscosity and prevents the agglomeration of color pigments.

Powders

HDK® enhances the free flow of powders.

Nail lacquers

HDK® assures uniform distribution of pigments, reduces sedimentation and allows rheology control.

Lipsticks

HDK® acts as a thickener and improves the consistency of lipsticks.

HDK® facilitates the uniform distribution of pigments and enhances thermal stability.

Antiperspirants

HDK® stabilizes suspensions, prevents the agglomeration of active ingredients and ensures their uniform distribution; it increases the viscosity of creams and sticks; either hydrophilic or hydrophobic HDK® can be used.

PACKAGING



Pallets with Paper Bags

HDK[®] is available in multilayer valved paper bags which contain 10 kg of product. The bags are delivered on pallets which are shrink-wrapped with a polyethylene foil to protect the HDK[®] against moisture. This allows the product to be stored without any moisture uptake. If the shrink foil is damaged or single bags are removed, care must be taken to protect the remaining bags/individual bags against moisture by either wrapping in plastic or other appropriate measures.

- Palletized and shrink-wrapped for good product protection, storage and handling
- Three-ply paper for added strength
- Bags are disposable

Big bags

The big bag solution is available for most HDK[®] grades, a woven polypropylene bag containing 150–200 kg of product, depending on the respective bulk density of the product. Big bags are delivered on a pallet shrink-wrapped with a polyethylene film to protect against moisture.

EXPERTISE AND SERVICE NETWORK ON FIVE CONTINENTS



• Sales and production sites, plus 20 technical centers, ensure you a local presence worldwide.

WACKER is one of the world's leading and most research-intensive chemical companies, with total sales of €4.63 billion. Products range from silicones, binders and polymer additives for diverse industrial sectors to bio-engineered 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 five business divisions, operating 24 production sites, WACKER is currently active in over 100 countries. The Group maintains subsidiaries and sales offices in 29 countries across Europe, the Americas and Asia – including a solidly established presence in China. With a workforce of 16,300, WACKER sees itself as a reliable innovation partner that develops trailblazing solutions for, and in collaboration with, its customers. WACKER also helps 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.

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