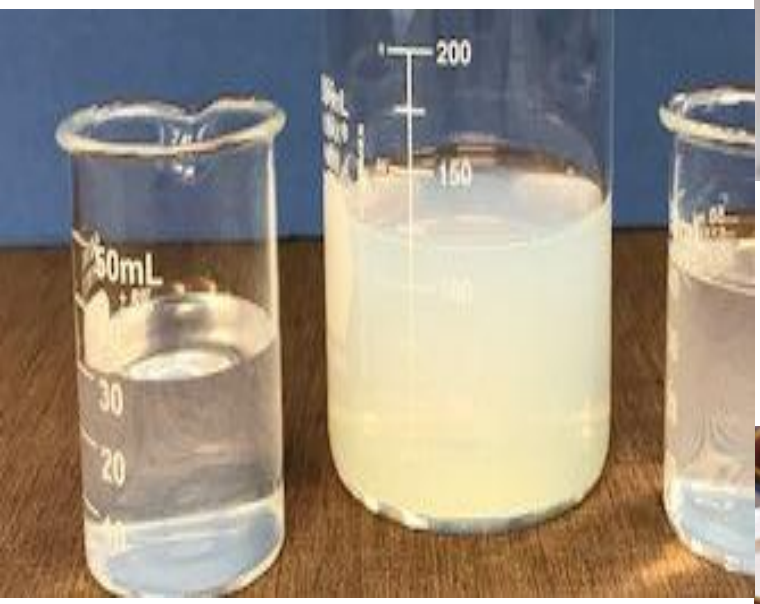
Flexisil™ Colloidal Silica for Paints & Coatings

Performance Enhancing Additives



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Flexisil Colloidal Silica:
Performance enhancing additives

Colloidal silica, also referred to as an aqueous dispersion of amorphous silicon dioxide (SiO2) nanoparticle, is widely used in paints & coatings due to its unique and highly customizable chemical and physical properties. ICT's Flexisil Colloidal Silica can be customized to meet your specific needs. Our state-of-the art processes give flexibility for a wide range of particle sizes (2-100 nm), customization of stabilizing & surface chemistry, minimizing impurities, and small to large volumes.

Typical Applications	
Architectural Coatings	Clear coats, Matte paints, Floor finishes
Industrial Coatings	Metal primers, Marine coatings, Anti-corrosion paints
Wood Coatings	Scratch-resistant varnishes and Furniture finishes
Automotive Coatings	Clear coats, Protective layers
Floor & Concrete Coatings	Densifiers, Hardeners, Slip-resistance finishes
Features for Paints & Coatings	
Nano-sized particles (5-80 nm)	Disperses easily in water-based systems
Surface area (30-500 m /gm)	High surface area provides strong interactions with binders & substrates
	Can control reactivity or thickening as needed
Colloidal suspension stability	Long shelf llife without settling or agglomeration
	Compatible with a wide pH range
Transparency	Coatings remain clear
	Particles are below visible light wavelength
Surface chemistry flexibility	Can be modified (cationic, anionic, neutral, & organic to suit different resin systems
	Silane surface-modified can act as a crosslinker, with the organic functional group
	closer to the polarity of the polymer matrix for creating a "single-phase-like"
	nanocomposite coating

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Flexisil™ Benefits by Market Use					
Benefit	**Industrial Coatings**	**Architectural Coatings**	**Wood Coatings**	**Automotive Coatings**	**Floor & Concrete Coatings**
Mechanical Strength & Abrasion Resistance	Reinforces polymer matrix for high wear resistance in harsh environments	Protects walls/facades from wear & scuffing, especially in high-traffic areas	Provides hardness and scratch resistance on furniture & flooring	Improves resistance to micro-scratches, swirl marks, and wear on clear coats	Excellent abrasion and impact resistance under foot traffic, forklifts, and heavy equipment
Chemical & Corrosion Resistance	Strong barrier vs. water, oxygen, and chemicals; prevents corrosion	Moisture & stain resistance on interior/exterior walls	Protects wood against stains, household chemicals, and cleaners	Helps resist chemicals, road salts, and environmental pollutants	Protects concrete from oils, fuels, salts, and cleaning chemicals
UV & Thermal Stability	Prevents chalking, discoloration, and thermal degradation in outdoor use	Maintains color retention & prevents fading; reduces yellowing	Protects against sunlight discoloration & maintains natural wood appearance	Enhances gloss retention, weatherability, and long-term durability	Increases resistance to UV exposure on outdoor slabs and prevents heat damage
Adhesion Improvement	Bonds well to metals, glass, ceramics, reducing delamination	Improves adhesion to concrete, plaster, wood, masonry	Stronger bonding to wood fibers and topcoats, preventing peeling	Enhances primer and topcoat intercoat adhesion	Improves bonding to porous substrates like cementitious floors
Surface Appearance & Control	Can provide gloss or matte finishes depending on formulation	Gloss reduction (matting) or satin effects for aesthetic control	Enhances clarity of wood grain; enables natural matte/satin looks	Provides depth, clarity, and uniform gloss in clear/top coats	Can create matte or slip-resistant surfaces for safety
Moisture Resistance	Reduces permeability, extending coating life	Repels water & reduces blistering in exterior paints	Limits water uptake that can warp or damage wood	Contributes to anti-fog and hydrophobic finishes	Prevents water ingress, freeze–thaw damage, and efflorescence
Rheology & Processing	Stabilizes pigments, prevents settling; improves flow/leveling	Enhances viscosity control for uniform film application	Improves film formation & sanding properties	Helps control sprayability, leveling, and sag resistance	Provides stable dispersion, reduces cracking/shrinkage
Sustainability (Waterborne Systems)	Compatible with waterborne, low-VOC protective coatings	Supports eco-friendly architectural paints	Enables low-VOC, waterborne wood finishes	Facilitates waterborne automotive basecoats & clearcoats	Waterborne floor coatings with low VOC, safer indoor use

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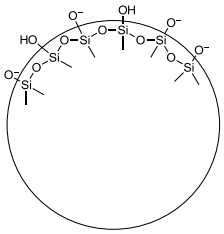
Application	Typical Addition Rate	Preferred Particle Size Range
Architectural paints (interior/exterior)	1-5%	20-50 nm
Industrial coatings (metal, marine, protective)	3-10%	8-40 nm
Clear coats & wood coatings	2-7%	5-20 nm
Automotive coatings (clear/top coats)	1-3%	5-15 nm
UV-curable coatings (optical, flooring, electronics)	5-15%	5-20 nm

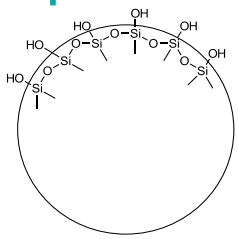
Surface Chemistry

pH 8 - 11



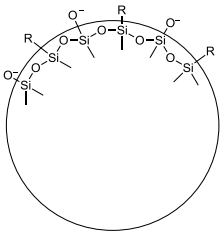
Anionic CS particles with Na^+, K^+ or NH_4 counter ions

pH 2 - 4



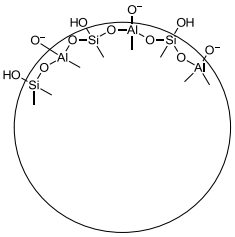
Deionized Fully protonated CS particle (nonionic)

pH 5 - 11



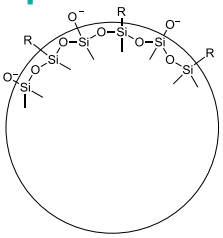
Anionic CS particles with surface aluminum

pH 2-6



Cationic CS particles with aluminum chloride

pH 3 - 11



Organic bonded CS noncharged to weak anionic under alkaline condition

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