Silica Nanoparticles Dispersion

Product Description

In recent years, the rapid advancement of nanotechnology has significantly expanded the application of nanomaterials in coating systems. Nano-silica, in particular, has attracted considerable attention due to its ability to enhance both the performance and durability of coatings. By incorporating nanomaterials, conventional coatings can achieve improved pigment suspension, enhanced thixotropy, and stronger adhesion, while also gaining superior resistance to aging, UV radiation, and contamination. These improvements allow standard coatings to be upgraded to high-performance materials suitable for demanding environments.

However, due to their extremely high surface energy and unique surface structure, nano-sized particles tend to agglomerate easily. Traditional dispersion techniques usually produce aggregates with particle sizes in the several-hundred-nanometer range, which prevents the nanomaterials from fully delivering their intended performance advantages.

To overcome this challenge, our company has developed proprietary nano-dispersion technology that enables complete and uniform dispersion of silica nanoparticles at the individual particle level in various solvent media. SIOResin nano-dispersion products are aqueous emulsions prepared from surface-treated nano-silica powders. They feature excellent stability and high transparency and can be directly incorporated into a wide range of coating systems, including styrene-acrylic and pure acrylic formulations. Coatings modified with these nano-dispersions exhibit significantly improved performance in terms of application properties, adhesion, water resistance, washability, corrosion resistance, UV resistance, aging resistance, weatherability, and self-cleaning capability.

Product Features

- Uniform nano-level dispersion: Proprietary nano-dispersion technology ensures silica nanoparticles are evenly dispersed at the individual particle level, maximizing their functional performance.
- Excellent compatibility: The nano-dispersions can be directly incorporated into various coating systems without complex formulation adjustments.
- Enhanced coating performance: Improves pigment suspension, thixotropy, and adhesion while significantly enhancing resistance to water, corrosion, UV radiation, aging, and environmental weathering.
- Improved durability and cleanliness: Coatings modified with nano-silica show better washability, stain resistance, and self-cleaning properties.
- High transparency: Maintains the optical clarity of clear or lightly pigmented coatings.
- Easy processing: The dispersion process is simple and does not require high-speed mixers, grinders, or ultrasonic equipment. Uniform dispersion can be achieved using standard stirring equipment.

Physicochemical Properties:

Parameter	H-3911	H-3912
Appearance	Transparent liquid	
Na_2O Content (wt%)	≤0.2%	
SiO_2 Content (wt%)	11 ± 0.5%	15 ± 0.5%
Density (20°C, g/cm³)	1.05–1.15	
pH (20°C)	7.0–8.0	
Viscosity (20°C, mPa·s)	≤10	
Particle Size (nm)	8–15	
Water Solubility	Completely miscible with water at 1:1 ratio, no precipitation	
Shelf Life	1 year	

Applications

SIOResin Silica Nanoparticles dispersions are suitable for a wide range of coating systems and advanced material applications, including:

- Waterborne architectural coatings
- Industrial protective coatings
- Automotive coatings
- Anti-corrosion coatings
- UV-resistant outdoor coatings
- Functional coatings requiring improved durability and weather resistance
- Specialty coatings requiring self-cleaning or high-performance surfaces