

CAB-O-SIL® FUMED SILICA IN WATER BASED COATINGS

Both hydrophilic and hydrophobic fumed silica can be effectively used in waterborne coating systems to provide following benefits at a loading of 0.5 - 1.0% of the total solid content of the system.

- Rheology control
- Suspension behavior
- Dispersibility of pigments
- Pigment stabilization
- Adhesion
- Abrasion resistance
- Corrosion protection &
- Water resistance

Dispersion of Cab-O-Sil Fumed silica

Bead mill, ball mill or high speed disperser can be used for easy dispersion of Cab-O-Sil fumed silica into water based coating systems.

In pigmented system the fumed silica need to be dispersed along with the pigment. In clear coatings, fumed silica need to be dispersed by masterbatch method (fumed silica concentration should be 3-5% relative to the binder concentration) followed by letdown process to the desire concentration.

Two Component Clear Coat Formulation	
Millbase	wt. %
Acrylate-Dispersion, 44 % in water	16.75
Water	1.65
Defoamer	1.23
Cab-O-Sil M5	0.6
Letdown media	
Acrylate-Dispersion, 44 % in water	52.87
Water	3.72
Defoamer	0.23
Curing agent	
Isocyanate, hydrophilic / Isocyanate, hydrophobic 1 : 1 (80 % in MPA)	22.95
Total	100.00

Cab-O-Sil Fumed Silica for Anti-Settling of Stoving fillers

Both hydrophilic and hydrophobic fumed silica in stoving fillers improves the sag resistance on vertical surface. Cab-O-Sil M5 and TS-610 can be used as anti-settling agent for the pigments and fillers.

Cab-O-Sil Function in Primer Formulation

In case of water soluble primer, hydrophobic silica is recommended because of their corrosion resistant properties and significant increase in rheological properties. The heavy fillers and pigments used in the primers are kept suspended by Cab-O-Sil TS-610 hydrophobic fumed silica. It also significantly reduces sagging of coatings on a vertical surface.

Cab-O-Sil Function in Base Coat & Clear Coat Formulation

Fumed silica improves the rheological properties of the material to be ground, which in turn improves the dispersibility of the pigments. In pigmented systems, higher pigment stability is attained as a result of the enveloping effect of fumed silica. The action of fumed silica as a spacer prevents re-agglomeration and flocculation of the pigments. The problem of sagging or cavity formation may occur in base coats, which necessitates the use of a rheological additive. Even at 0.5 – 1.0% Cab-O-Sil (relative to total coating formulation) in the base coat or clear coat leads to significant improvement of the mechanical properties such as inter-coat adhesion.

For improved abrasion resistance higher concentration of fumed silica is necessary. Particularly in the case of highly filled

pigmented systems, it is often advantageous to use hydrophobic fumed silica as opposed to hydrophilic products. In clear coatings, on the other hand, hydrophilic fumed silica controls rheology more effectively.

In the unpigmented coatings the hydrophilic Cab-O-Sil M5 fumed silica has significantly greater rheological action than the hydrophobic fumed silica TS-610.

Cab-O-Sil Function in Top Coat Formulation

In two-component coatings, pot life is an important criterion; the rheological additive should therefore not negatively impact the processability.

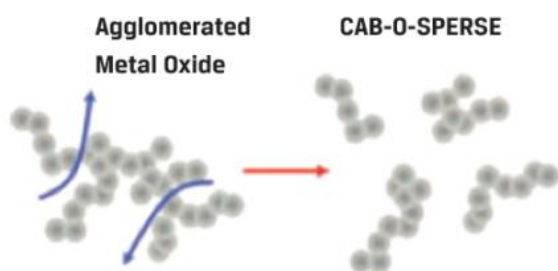
The use of Cab-O-Sil fumed silica ensures favorable pot-life behavior. The use of rheological additives in top coats requires that these have no adverse effect on the gloss.

Cab-O-Sil Grade Recommendation			
Properties	Rheology Control Anti Sagging	Anti-Settling Pigment Stabilization	Corrosion Protection
Water Based Coatings (Clear Coats)			
Cab-O-Sil	M5	NA	NA
Water Based Coatings (Pigmented systems)			
Cab-O-Sil	M5	TS-610	TS-610

Water based Polytetrafluoroethylene (PTFE) Coatings			
Silica Type	Loading	Function	Dispersion equipment
Cab-O-Sil M5	0.5-1.0%	Rheology control & anti-settling	High speed dissolver
Cab-O-Sil TS-610			

CAB-O-SPERSE® in Waterborne Coatings

CAB-O-SPERSE dispersions are highly stable dispersions of fumed silica.



CAB-O-SPERSE products are characterized by efficient distribution of metal oxide aggregates

Hydrophobic fumed silica dispersion in aqueous pigmented coatings and water-based clear coats provides following benefits in automotive, plastic, wood and industrial coatings.

- Thickening and thixotropy
- Anti-settling

- Pigment stabilization
- Improved mechanical properties

In a water based coatings containing binders, 5-10% of fumed silica dispersion (equivalent to 1-2% of fumed silica powder) calculated based on entire coating formulation is required. The binder molecules actively participate in the network build-up by means of interaction with fumed silica aggregates. The dispersion should be added to the coating under agitation at low to average shearing forces using a stirrer or dissolver blade typically at the letdown phase to get the desired viscosity built up. High shearing forces, like those generated in a bead mill, should be avoided; as these high shear forces would irreversibly destroy the customized structure of the aggregates.