CABOT

FUMED METAL OXIDES

SELECTION GUIDE

CAB-O-SIL® FUMED METAL OXIDES FOR COATINGS

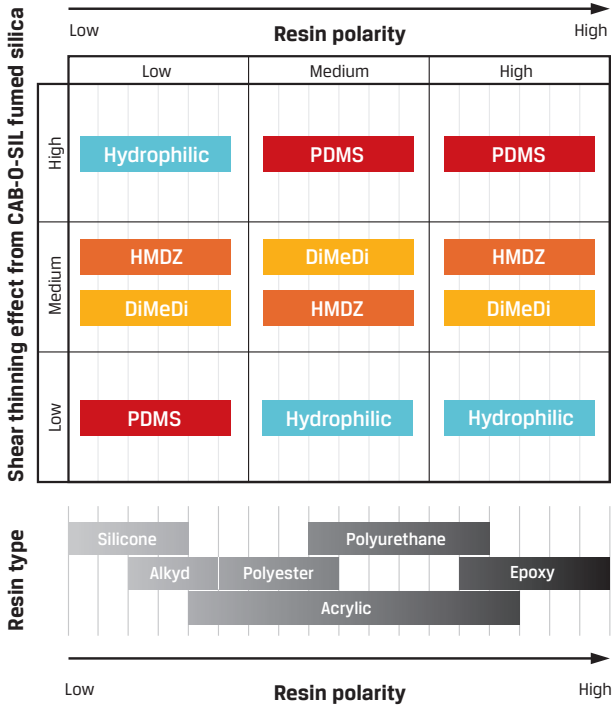
Material category	Lead application	Cabot products	Treatment agent	Selection guidelines
HYDROPHOBIC FUMED SILICA	- Industrial - Marine	TS-720	PDMS	CAB-O-SIL TS-720 and TS-710 fumed silicas are suggested for use in highly polar resin systems. PDMS treated products deliver excellent sag resistance and anti-settling performance, while imparting hydrophobicity and mechanical reinforcement.
		TS-710		
	- Industrial - Coil - Auto - Wood	TS-610	DiMeDi	CAB-O-SIL TS-610 fumed silica is suggested for use as a rheology agent in both polar and non-polar resin systems, especially when ease of dispersion is a primary formulation consideration.
	- Powder - Industrial - Auto	TS-5022	HMDZ	CAB-O-SIL TS-530 and TS-5022 fumed silicas are suggested for use as a rheology control agents in polar resin systems. Both products help customers obtain the right balance between high sag resistance and good film appearance. TS-530 fumed silica can also be used as a free flow additive in powder coatings when low moisture pickup is desired.
		TS-530		
HYDROPHILIC FUMED SILICA	- Industrial - Powder	EH-5	None	Hydrophilic fumed silicas are suggested for use in non-polar resin systems, or in formulations where shelf stability is not a major consideration. Higher surface area products are more difficult to disperse, but they deliver greater thickening effect. EH5 fumed silica is highest surface area, LM-150 fumed silica is lowest.
		H-5		
		M-5		
		LM-150		
FUMED ALUMINA	- Powder - Wood	SpectrAl 100	None	Fumed alumina is suggested for use as a tribocharging agent in powder coatings and as a scratch resistance additive in wood coatings.
		SpectrAl 81	None	
		SpectrAl 51	None	

Rheology effect of CAB-O-SIL fumed silica in solvent-based paints

Fumed silica selection for rheological effect

The rheological effect of fumed silica in coatings is highly dependent on the polarity of the system and selection of the appropriate fumed silica. Generally, the polarity of the system is driven by the polarity of the resin. Use the table below to select the fumed silica with the greatest rheological effect in a given resin system.

The actual effect of fumed silica in a given formulation is also dependent on dispersion quality, solvent polarity and additive selection.



Additional products are available for specific applications. For details, please contact your regional Cabot technical support representative.

Fumed silica: key product benefits

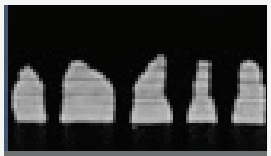
Fumed silica delivers rheology control, mechanical enhancement and anti-corrosive performance in a wide variety of coatings applications. Optimal performance is enabled by selecting the appropriate product. All **CAB-O-SIL** products deliver rheology control and mechanical enhancement. Anti-corrosive performance is maximized with our most hydrophobic products.

1: RHEOLOGY CONTROL

Rheology control is one of the most common uses of treated and untreated fumed silica in coatings. The main functions of a rheology control agent are:

Sag resistance

The resistance of a coating to flow under its own rate. The higher the thickness of a coating, the greater sag resistance is required. Fumed silica particles have the ability to network and span volume much more efficiently than other particles.



Epoxy coating without **CAB-O-SIL** fumed silica

Epoxy coating with **CAB-O-SIL** fumed silica

Anti-settling

The ability of an additive to prevent the settling of heavy pigments present in the coating. Fumed silica prevents settling due to its ability to form a network within the coating and hold the denser pigments in place.

Coating with significant pigment settling

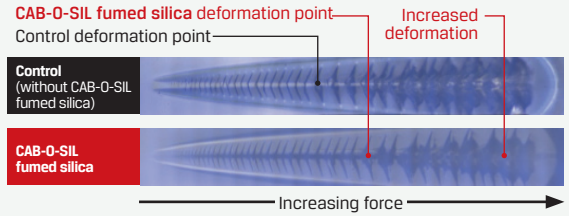
Coating without any pigment settling

2: MECHANICAL ENHANCEMENT

Fumed silica enhances the resistance of cured coatings to mechanical stress. The introduction of hard fumed silica particles inhibit scratching on the surface of a coating, and they improve the ability of a coating to dissipate energy without catastrophic failures in the form of large cracks.

Scratch resistance

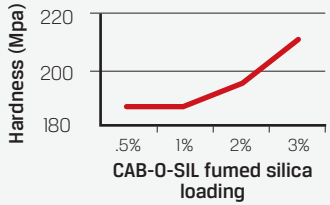
The ability of a film surface to resist cracks and micro-cracks when abraded. The hard silica particles are distributed throughout the film, including at the surface where they improve scratch resistance.



Test conditions: A diamond tip drawn across the surface of a coating at increasing force, observed under optical microscope. Scale = 2mm.

Hardness

Hardness is measured as the amount of force required to deform the coating permanently. When force is applied to a coating containing **CAB-O-SIL fumed silica**, the force is transferred to the harder silica particle, effectively increasing the hardness of the entire film.



Increasing the loading of **CAB-O SIL fumed silica** in this acrylic coating increases the hardness of the film by more than 10%.

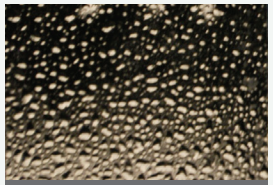
3: ANTI-CORROSION

Fumed silica enhances the ability of a coating to prevent corrosion. The introduction of hydrophobic fumed silica particles helps prevent the migration of water from the surface of the film to the substrate below.

Anti-blistering

Metal substrates corrode in the presence of water, oxygen and an electrolyte. This reaction results in the delamination of the coating from the substrate. Fumed silica prevents water from reaching the substrate, thereby minimizing blistering.

EPOXY SYSTEM



Without **CAB-O-SIL** fumed silica

With **CAB-O-SIL** fumed silica

Reduced scribe creep

A coatings ability to prevent corrosion is severely compromised by the presence of deep scratches. Fumed silica minimizes this effect by preventing water from penetrating the film at the point of the scratch, inhibiting corrosion and further delamination.

ALKYD SYSTEM

Without **CAB-O-SIL** fumed silica

With **CAB-O-SIL** fumed silica

CABOT

cabotcorp.com

Technical Support
North America: 1 800 462 2313
South America: +55 11 2144 6400
Europe: +371 670 50 900
Asia Pacific: +86 21 5175 8800