CABOT

FUMED METAL OXIDES

APPLICATION GUIDE

CAB-O-SPERSE® DISPERSIONS FOR INDUSTRIAL COATINGS

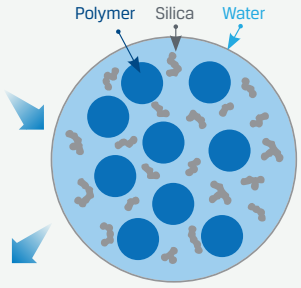
WHY CAB-O-SPERSE DISPERSIONS IN COATINGS?

CAB-O-SPERSE dispersions provide the following benefits to industrial coatings formulations:

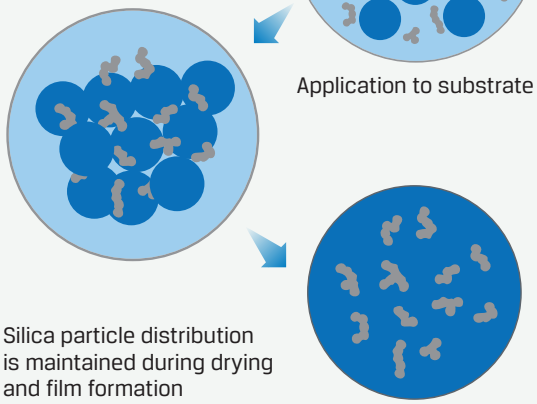
1. Performance enhancement
   - Increased film hardness and abrasion resistance
   - Enhanced corrosion resistance and barrier properties
   - High clarity
   - Rheology control: pumpability, sprayability and film sag resistance
   - Reduced time to tack free films
2. Ease of processing
3. Ultra-high purity

The CAB-O-SPERSE dispersion advantage

Adding CAB-O-SPERSE dispersions to polymer latex yields stable dispersions with very low energy input



Application to substrate

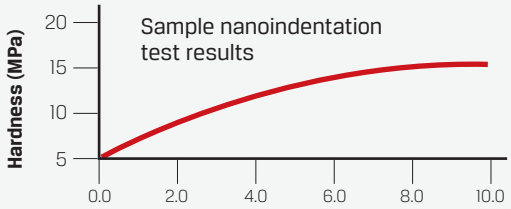


Silica particle distribution is maintained during drying and film formation

ENHANCED DURABILITY

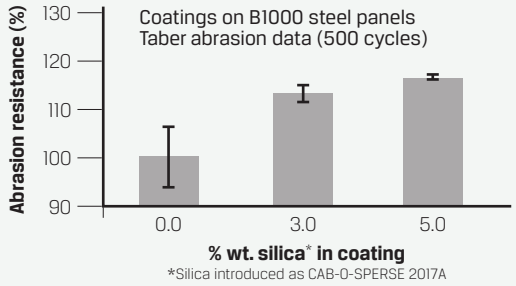
Up to 3x greater hardness

CAB-O-SPERSE dispersions increase hardness up to 3x in waterborne acrylic coatings



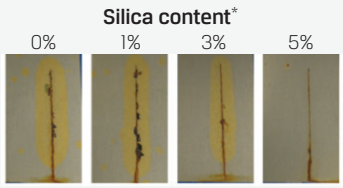
Greater abrasion resistance

CAB-O-SPERSE dispersions improve abrasion resistance of a sample waterborne acrylic coating by up to 20%.



Improved corrosion resistance

CAB-O-SPERSE dispersions provide good corrosion resistance by delivering strong barrier properties.



Salt spray tests (120hr) for WB acrylic coatings on B1000 steel panels

*Silica introduced as CAB-O-SPERSE 2017A dispersion

HIGH TRANSPARENCY

Greater particle size stability...

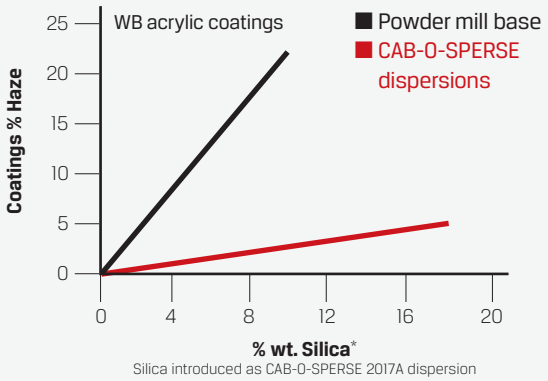
CAB-O-SPERSE dispersions are more stable relative to dry powder fumed silica mill bases, and therefore will not agglomerate over time.

Sample type	Mean agglomerate size (µm)
BET 200 fumed silica mill base (1 day)	0.14
BET 200 fumed silica mill base (30 day)	90.28
CAB-O-SPERSE 2017A dispersion (1 day)	0.14
CAB-O-SPERSE 2017A dispersion (30 day)	0.14

Data obtained by light scattering measurements with constant solids loading

...Leads to improved clarity

The stability provided by CAB-O-SPERSE dispersions lead to superior optical properties like high clarity (low haze) even at high loadings >10% wt. relative to coatings formulated with silica from powder mill bases.



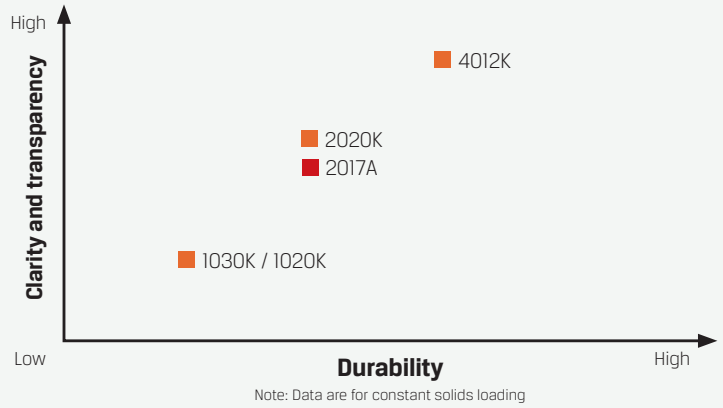
RELATIVE PERFORMANCE IN INDUSTRIAL COATINGS

Suggested products:
CAB-O-SPERSE dispersions: 2020K, 2017A, 1030K, 1020K, 4012K

General guidelines:
- Large particles facilitate formulation stability
- Small particles promote transparency

Legend:

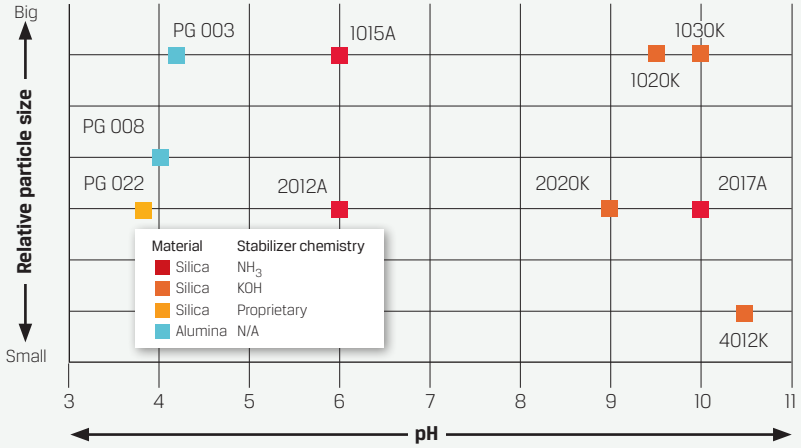
Material	Stabilizer chemistry	Particle charge
Silica	NH_3	Anionic
Silica	KOH	Anionic
Silica	Proprietary	Cationic
Alumina	N/A	Cationic



Note: Data are for constant solids loading

CAB-O-SPERSE PRODUCTS AND PROPERTIES

CAB-O-SPERSE product	Loading	Charge
1015A	15%	Anionic
1020K	20%	Anionic
1030K	30%	Anionic
2012A	12%	Anionic
2017A	17%	Anionic
2020K	20%	Anionic
4012K	12%	Anionic
PG 003	40%	Cationic
PG 008	40%	Cationic
PG 022	20%	Cationic



FORMULATION INFORMATION

CAB-O-SPERSE dispersions can be added to attain the desired final particle loading in waterborne formulations. Below is a sample acrylic industrial coating formulation.

Coating formulation contents	% wt.
Acrylic polymer latex (40% wt.)	80.0%
Water diluent	8.3%
Sodium nitrite (25% in water) flash rust inhibitor	1.2%
Defoamer	0.4%
Surfactant / wetting agent	0.4%
Wetting agent	0.1%
Dipropylene glycol methyl ether cosolvent	2.4%
Propylene glycol normal butyl ether cosolvent	4.8%
Dipropylene glycol normal butyl ether cosolvent	2.4%
SUM	**100%**

Fomulation guidance:
- CAB-O-SPERSE dispersions do not require any additional grinding or dispersing before incorporation into waterborne polymer systems
- Fumed metal oxide particles delivered by CAB-O-SPERSE dispersion should be 1%-10% in dry coating
- To minimize potential shock, CAB-O-SPERSE product should be selected to match pH of formulation
- Specific to the proxy formulation above, premix everything but the latex and then post-add it to the latex under agitation

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