

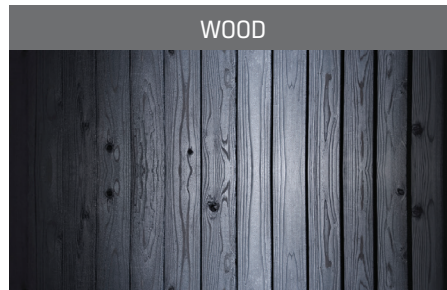
SPECTRAL[®] FUMED ALUMINA IN WATERBASED ACRYLIC COATINGS

Application Description

Waterbased resins are increasingly used for clear topcoats in a variety of coatings end markets. Acrylic resins offer excellent external durability and provide formulators with excellent formulation flexibility to meet market demands.

Cabot's line of Spectral[®] fumed alumina further enhances the durability of waterbased acrylic topcoats. The addition of the hard alumina particles imparts excellent scratch and abrasion resistance to the coating.

Waterbased Acrylic Coatings that Can Use Fumed Alumina Include:

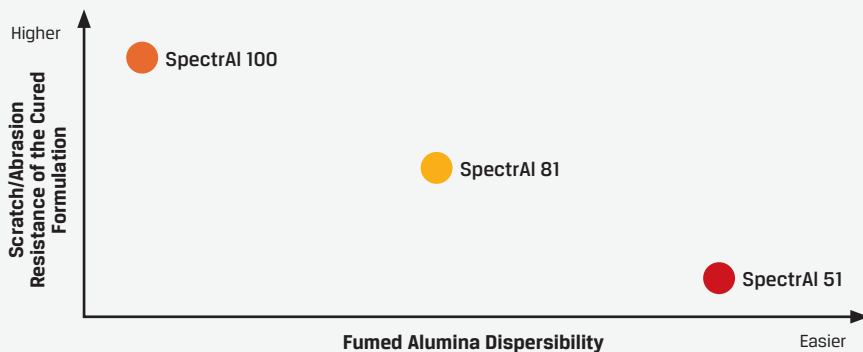


CABOT PRODUCT OFFERING

Fumed Alumina Product	Typical Surface Area (m ² /gm)	Typical Bulk Density	Typical Refractive Index	Typical pH (4% aqueous slurry)
SpectrAl 51	55	110	1.77	4.7
SpectrAl 81	80	80	1.77	4.7
SpectrAl 100	95	60	1.77	4.7

The data in the table above are typical test values intended as guidance only, and are not product specifications. Product specifications are available from your Cabot representative.

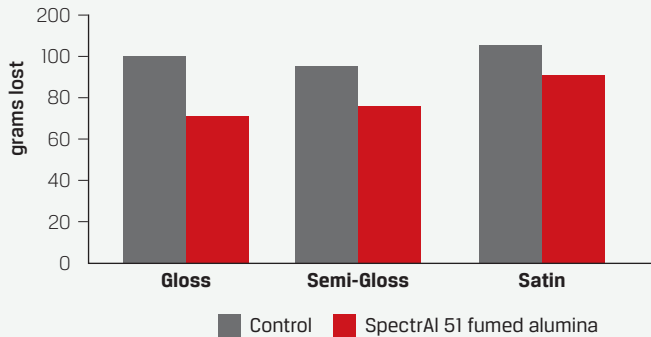
PRODUCT PERFORMANCE



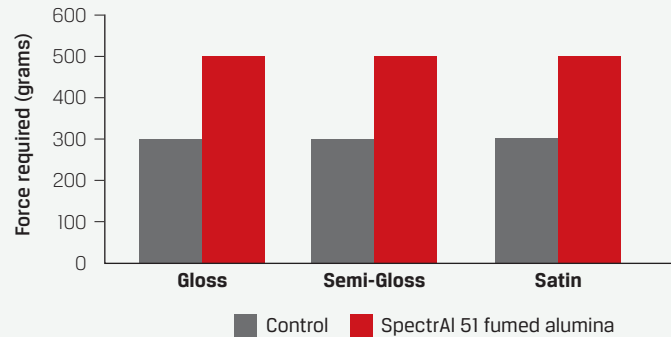
When using fumed alumina in waterbased clearcoats, formulators must manage a tradeoff between scratch and abrasion resistance and the dispersability of the alumina in formulation. Higher surface area fumed aluminas offer greater scratch and abrasion resistance but can be harder to disperse.

PRODUCT PERFORMANCE

Taber Abrasion Performance



Hoffman Scratch Performance



In Taber abrasion tests, the weight lost from the film when subjected to continuous abrasion is measured. The addition of fumed alumina to the model formulation reduces the weight loss by up to 30%. Higher surface area products including SpectrAl 81 and SpectrAl 100 fumed aluminas offer greater abrasion performance, but may decrease clarity.

In Hoffman scratch tests, the amount of force required to cut the film down to the substrate is measured. The addition of fumed alumina to the model formulation increases the force that is required by 66%.

The product performance results above were obtained using the model formulation that follows. In the control, no fumed alumina was added to the formulation.

MODEL FORMULATION

Grind Portion

Product Name	Description	Amount (%)
Neocryl® XK-12	Resin	59.46
Foamaster® NXZ	Defoamer	0.38
Water	Water	31.51
Acrysol® RM1020	Associative Thickener	3.23
SpectrAl 51	Fumed Alumina	5.42
Total		100.00

- Premix Neocryl XK-12 resin, Foamaster NXZ defoamer, Water and Acrysol RM1020 associative thickener together under good agitation
- Post add SpectrAl 51 fumed alumina slowly to the premix under good agitation
- Grind the above at 5000RPM for 20 minutes then slow down to 500-1000RPM and proceed with the finish formulation

Letdown Portion

Product Name	Description	Amount (%)
Neopac® E-125	Resin	46.79
Neocryl XK-12	Resin	32.59
Dipropylene Glycol (Mono) Methyl Ether	Co-solvent	5.58
Dipropylene Glycol n-Butyl Ether	Co-solvent	2.66
Propylene glycol	Freeze/thaw Agent	0.72
Water	Water	8.69
Dehydran® 1293	Defoamer	0.09
BYK 346	Wetting Agent	0.28
Michem® 39325	Wax Emulsion	2.42
DSX® 1514	Associative Thickener	0.18
Total		100.00

- Premix the Neopac E-125 resin, Neocryl XK-12 resin, co-solvents, propylene glycol, water, Dehydran 1293 defoamer, BYK 346 wetting agent, Michem 39325 wax emulsion and DSX 1514 associative thickener together

Finish Formulation

Component	Amount (%)
Grind portion	18.28
Letdown portion	81.72
Total	100.00

- Add the letdown portion to the grind portion in specified ratio under good agitation
- Mix for another 15 minutes, discharge then proceed to the application and testing stage

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