MINIFIBERS, INC.

Evaluation of High Viscosity Epoxy formulations using SHORT STUFF® ESS5F

2022

Purpose

To evaluate SHORT STUFF® HDPE as a Fumed Silica replacement in a "high" viscosity Industrial Epoxy coating.

STABILITY TEST DESCRIPTION

To evaluate viscosity performance of an unpigmented industrial epoxy formulation by replacing Fumed Silica with SHORT STUFF®: ESS5F as rheology control. Standard commercial "High Viscosity" Bis A epoxy and a cycloaliphatic amine hardener were selected. Viscosity and visual color evaluation over a period of 21 days ware recorded.

High Viscosity Epoxy Formulation

Product	Description	Parts by weight Control	Parts by weight ESS5F
Epoxy Resin	Resin	100.0	100.0
Curing Agent	Hardener	50.0	50.0
HDPE	SHORT STUFF® ESS5F	---	**0.6** % On total formulation
Fumed Silica	Aerosil® 200	**1.2**% On total formulation	---
Deaerator	Airex 931	0.7% On total formulation	0.7% On total formulation

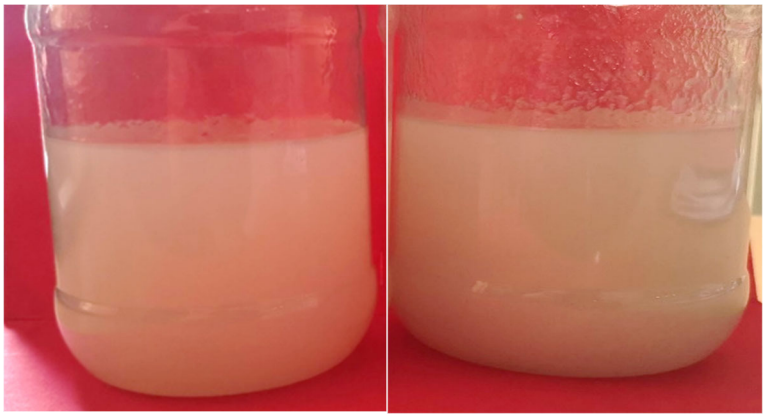
Experimental:

Step 1.

Under low mix shear half of the deaerator was added to Part A (Epoxy) and then added the fumed silica to the control and ESS5F to the experimental mixtures. Continued mixing for 20 minutes at a shear speed of 150 and added the remainder deaerator.

NOTE: The Part B hardener was not mixed with Part A so that package stability behavior could be observed.

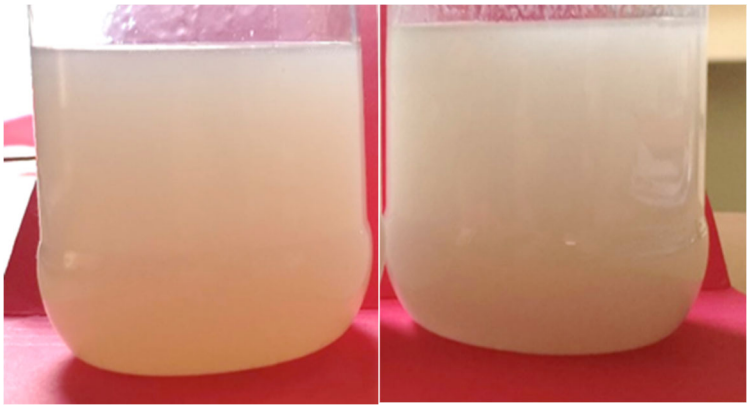
HIGH VISCOSITY FORMULATION – DAY -1



Aerosil® 200 (1.2%) **SHORT STUFF® ESS5F (0.6%)**

	AEROSIL® 200	SHORT STUFF® ESS5F
Viscosity @25°C #4 Spindle, Speed 10 rpm	**10,900 cps**	**9,200 cps**

HIGH VISCOSITY FORMULATION – DAY-3



Aerosil® 200 (1.2 %) **SHORT STUFF® ESS5F (0.6%)**

	AEROSIL® 200	SHORT STUFF® ESS5F
Viscosity @25°C #4 Spindle, Speed 10 rpm	**6,900 cps**	**6,800 cps**

VISCOSITY- HIGH VISCOSITY FORMUALTION- DAY- 6

Aerosil® 200 (1.2%) **SHORT STUFF® ESS5F (0.6%)**

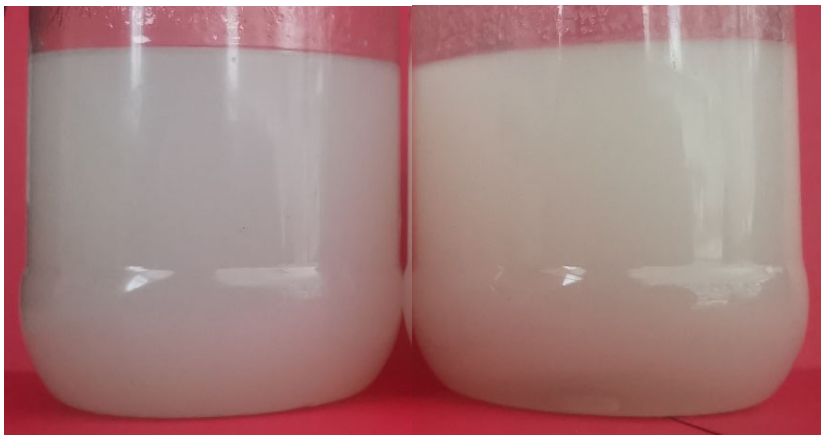
	AEROSIL® 200	SHORT STUFF® ESS5F
Viscosity @25°C #4 Spindle, Speed 10 rpm	**10,600 cps**	**12,200 cps**

VISCOSITY- HIGH VISCOSITY FORMULATION-DAY-11

Aerosil® 200 (1.2%) **SHORT STUFF® ESS5F (0.6%)**

	AEROSIL® 200	SHORT STUFF® ESS5F
Viscosity @25°C #4 Spindle, Speed 10 rpm	**9,600 cps**	**13,400 cps**

VISCOSITY- HIGH VISCOSITY FORMULATION - DAY 14



Aerosil® 200 (1.2%) **SHORT STUFF® ESS5F (0.6%)**

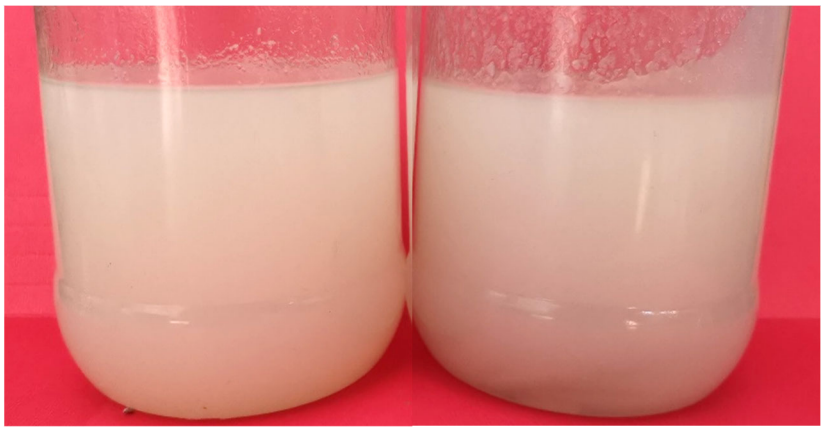
	AEROSIL® 200	SHORT STUFF® ESS5F
Viscosity @25°C #4 Spindle, Speed 10 rpm	**10,400 cps**	**13,400 cps**

VISCOSITY- HIGH VISCOSITY RESIN-DAY-18

Aerosil® 200 (1.2%) **SHORT STUFF® ESS5F (0.6%)**

	AEROSIL® 200	SHORT STUFF® ESS5F
Viscosity @25°C #4 Spindle, Speed 10 rpm	**10,200 cps**	**13,400 cps**

VISCOSITY- HIGH VISCOSITY RESIN - DAY- 21



Aerosil® 200 (1.2%) **SHORT STUFF® ESS5F(0.6%)**

	AEROSIL® 200	SHORT STUFF® ESS5F
Viscosity @25°C #4 Spindle, Speed 10 rpm	**10,400 cps**	**13,400 cps**

Conclusion:

SHORT STUFF® ESS5F is a good alternative to Aerosil® 200 Fumed Silica in High Viscosity Industrial Epoxy coatings. The viscosity profiles are very comparable, with reproducible, consistent readings throughout the duration of the 21-day test.

In addition, SHORT STUFF® ESS5F provided these results at ½ the normal dosage rate of Fumed Silica. This 50% reduction in required dosing provides the potential to significantly reduce raw material cost, while maintaining overall performance. In fact, a further reduction to 0.5% total SHORT STUFF® ESS5F is possible to more closely match the viscosity of Aerosil® 200.

ACKNOWLEDGEMENT

MiniFIBERS, Inc., would like to thank InterTrade, S.A. de C.V. for conducting this evaluation of SHORT STUFF® fibrillated HDPE as a fumed silica replacement in High Viscosity Industrial Epoxy Coatings.