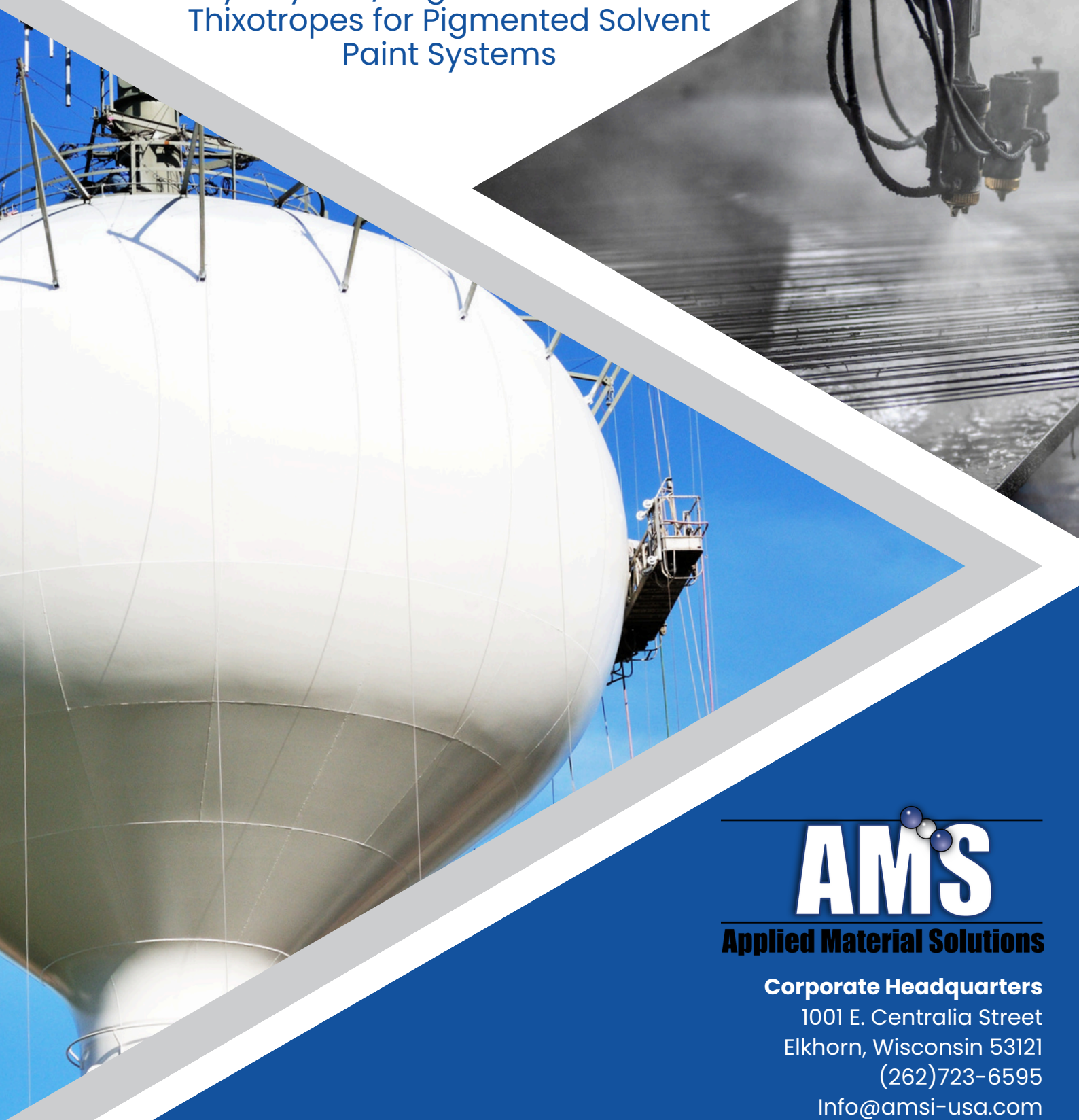
AMSTHIX™

RHEOLOGY ADDITIVES

Polyethylene/Vegetable Based Wax Thixotropes for Pigmented Solvent Paint Systems



AMS
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INTRODUCTION TO AMSTHIX™

AMSTHIX™ products are recommended as anti-settling additives for various types of non-aqueous systems, e.g. coatings. In addition, AMSTHIX™ products impart great sag control while remaining very thixotropic in the media. At recommended concentrations, AMSTHIX™ products do not take away from other coating properties such as film formation, leveling, flow, gloss, and durability, as well as adhesion and film flexibility.

AMSTHIX™ formulas are easy to add to solvent systems during the manufacturing process, preferably in the mill or grind stage. AMSTHIX™ requires an elevated temperature and high shear incorporation over a certain dwell time for the full activation, making it critical to utilize during the mill or grind stage.

AMSTHIX™ products are available as liquids and pastes in various solvent bases.

BENEFITS & FEATURES

- Easy to incorporate
- Good sag control of the coating
- Excellent anti-settling properties at low dosages
- Long-term shelf stability at high storage temperatures
- Non-hygroscopic
- High pigment loadings are easily stabilized

STRUCTURE

AMSTHIX™ formulas are based on straight chain polyethylene complexes with natural wax adjuncts, and are available in select solvent carriers. Upon activation, AMSTHIX™ products provide pigment suspension by chain entanglement through the polyethylene crystalline wax. This intricate structure supports the pigment/extender suspension in the liquid state by increasing the elastic character of the substrate at rest. The created molecular web provides a non-bonding complex that allows for the anti-settling of heavy loaded pigment systems.

INCORPORATION AND ACTIVATION

Proper activation of AMSTHIX™ occurs typically in three stages. Activation is preferably started in the initial grinding phase or the mill-base under shear agitation with the resin and solvent. The second phase requires both high shear agitation and heat activation which allows the AMSTHIX™ product to soften and break up. Heat development above the required minimum temperature for at least 30 minutes is required to allow the initial crystalline form to extend into a straight chain structured network.

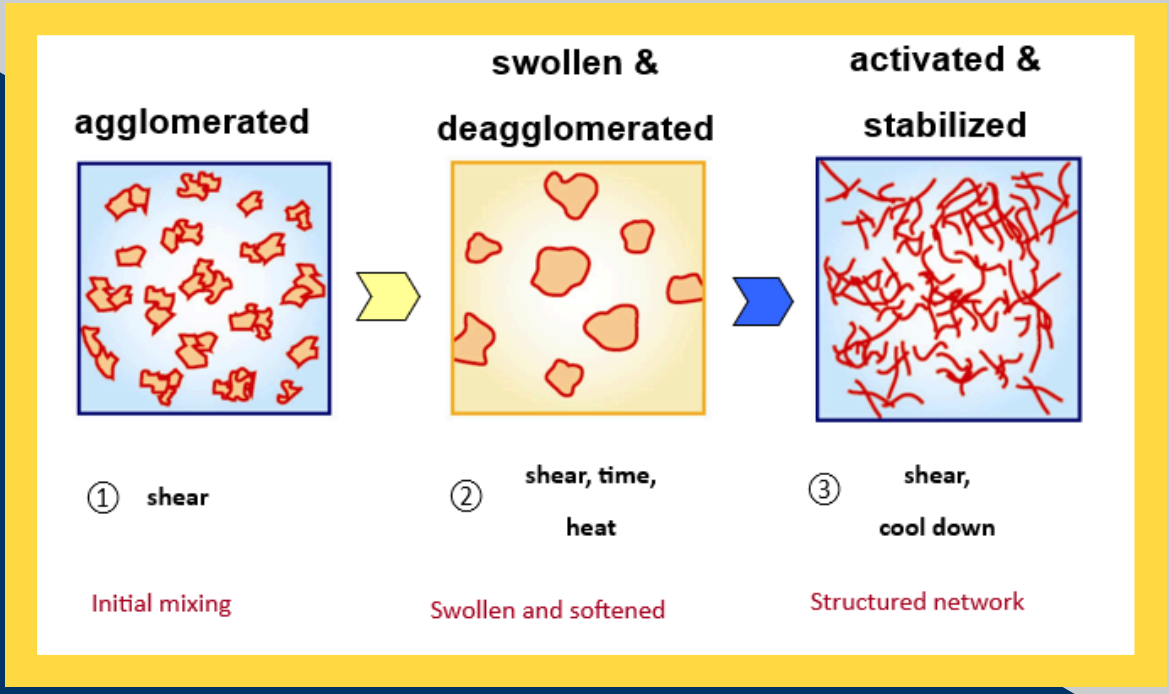


Fig. 1

The AMSTHIX™ polyethylene wax-based anti-settling agents are easy to incorporate during the mill-base processing of coatings manufacturing. All grades of AMSTHIX™ require both a minimum activation temperature of above 140° F for 30 - 60 minutes and high-speed dispersion (Fig. 1). There is no upper temperature limit as with other products.

Grades and Properties

AMSTHIX™	FORM	Carrier Solvent	Non-volatility	Specific Gravity	FlashPoint (Closed Cup)
1017	Paste	Mineral Spirits	18%	0.80	25 ⁰ C
1018	Paste	Xylene	24%	0.87	25 ⁰ C
1020	Paste	Light Mineral Oil	18%	0.85	200 ⁰ C
1038	Liquid	Xylene	20%	0.88	25 ⁰ C
1048	Paste	Mineral Spirits	40%	0.80	25 ⁰ C
1060	Paste	Xylene	42.5%	0.895	25 ⁰ C

PRODUCT PRODUCTION EXAMPLE

Green cobalt chromite is a heavy green pigment of a density at 5.24 g/cm^2 that is used in coloring concrete. It is designed to create a ready-to-use concentrated pigment dispersion to allow precast concrete facilities to adjust color to customer preference. It is desired to have an easily mixable solution that would keep the pigment dispersed and suspended to avoid mixing prior to use at the job site.

The following formula was developed by Applied Material Solutions:

Product	Company	Formula
Oxerra Green 26	Oxerra	49.00%
Puretol 7	Petro Canada	49.50%
AMSTHIX™ 1020	Applied Material Solutions, Inc.	1.00%
Calimulse PR	Pilot	0.50%

Puretol 7 and AMSTHIX™ 1020 were added to the mill tank fitted with a Morehouse Cowles blade disperser, and the Oxerra Green 26 was slowly metered in under moderate agitation. The Calimulse RP was then added. The solution was dispersed under high speed for 2 hours and attained a temperature of 140^0 F. The mixture was then transferred to a Schold VIM Media Mill where the mixture was milled for 150 minutes at 155^0 F. The final mixture was cooled down.

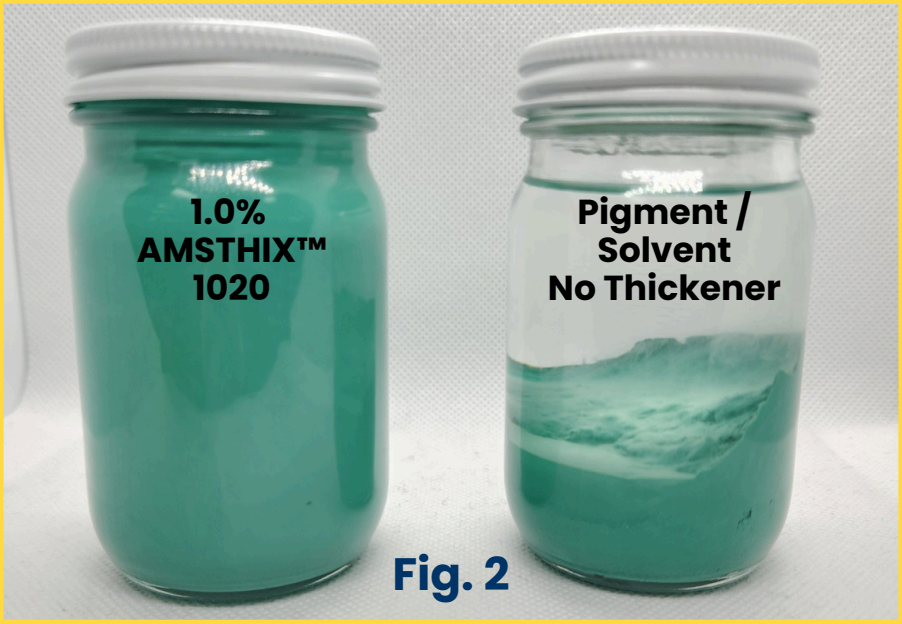
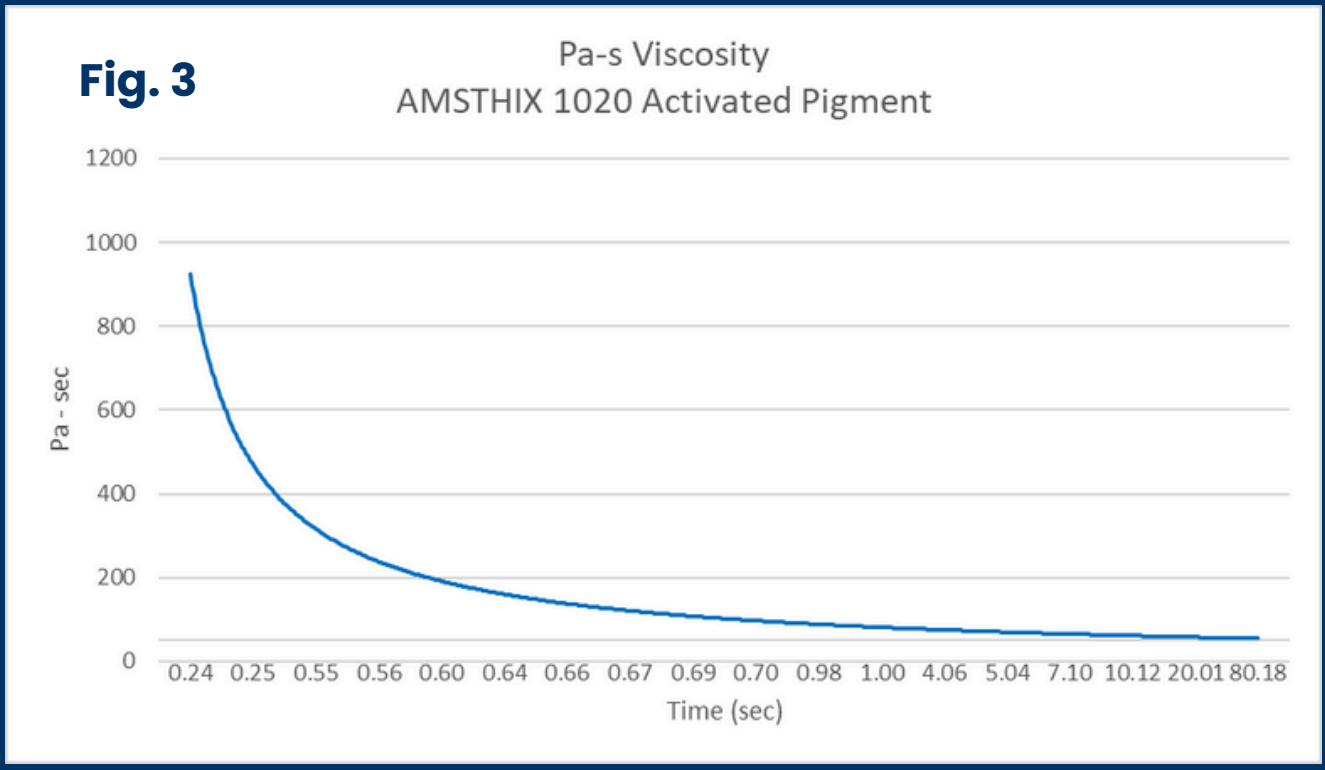


Fig. 2

The viscosity of the product was measured on a Waters HR10. From the viscosity curve over a sweeping shear rate, it is evident that during states of no shear and static rest, the mixture's viscosity is complex and thereby holds the pigments in solution. With the smallest application of shear, the thixotropic mixture readily flows and allows proper distribution in any system. The Ferrotint Green F18 dispersion has been shelf stable for greater than 18 months with no separation (Fig. 2).

Fig. 3



The above viscosity curve (Fig. 3) demonstrates the thixotropic character of the product. The slightest force allows the pigmented dispersion to flow readily.

AMSTHIX™

PRODUCT LINE

PRODUCT	SOLVENT	FORM	ACTIVE	RHEOLOGICAL BEHAVIOR	ACTIVATION	USE LEVEL	SYSTEM	COMPOSITION & USE
AMSTHIX 1017	Mineral Spirits	Paste	25.0%	Anti-settling agent and thixotropic	Temperature greater than 145^0 F for 30-60 minutes and high shear agitation	0.5-2.0%	Miniral Spirits, Aliphatic Systems	Dispersion of polyethylene wax and vegetable solids for aliphatic systems
AMSTHIX 1018	Xylene	Paste	26.5%	Anti-settling agent and thixotropic	Temperature greater than 145^0 F for 30-60 minutes and high shear agitation	0.5-2.0%	Xylene, Aromatic Solvents	Dispersion of polyethylene wax and vegetable solids for aromatic systems
AMSTHIX 1020	Light Mineral Oil	Paste	25.0%	Anti-settling agent and thixotropic	Temperature greater than 145^0 F for 30-60 minutes and high shear agitation	0.5-2.0%	Mineral Oil, Polyol, Aliphatic Systems	Dispersion of polyethylene wax and vegetable solids, HAPS free
AMSTHIX 1038	Xylene	Liquid	21.2%	Anti-settling agent and thixotropic	Temperature at 140-150^0 F for 30-60 minutes and high shear agitation	0.5-2.0%	Xylene, Aromatic Solvents	Dispersion of polyethylene wax and vegetable solids for aromatic systems
AMSTHIX 1048	Mineral Spirits	Paste	40.0%	Anti-settling agent and thixotropic	Temperature greater than 145^0 F for 30-60 minutes and high shear agitation	0.5-1.5%	Mineral Spirtis, Aliphatic Systems	Dispersion of polyethylene wax and vegetable solids for aliphatic systems
AMSTHIX 1060	Xylene	Paste	42.0%	Anti-settling agent and thixotropic	Temperature greater than 145^0 F for 30-60 minutes and high shear agitation	0.5-2.0%	Xylene, Aromatic Solvents	Dispersion of polyethylene wax and vegetable solids for aromatic systems