ELEMENTIS

A global specialty chemicals company

Application Leaflet

RHEOLATE® 125

Rheology modifier for spray applied aqueous, industrial coating systems

Key Benefits

- Shear thinning flow for optimum sprayability
- Stable viscosity build over wide pH range
- Rapid viscosity recovery excellent sag control and circulation stability

Introduction

High performance industrial coating systems are often requiring a shear thinning profile to facilitate good spray behavior and atomization. As vertical objects are sprayed the sag control is a significant requirement for any industrial and wood coating formulation. Additionally, industrial and wood coating formulations typically are loaded with high density pigments and extenders that require a rheological additive to provide for settling control. In case of metallic pigments, it is highly desired to optimize the orientation of the metallic flakes to get the maximum benefits possible.

As coatings are often circulated in the application facility the coating is subjected to considerable shear forces. These conditions can cause a coating system to break down and loose its viscosity profile causing pigment settling and loss of sag control.

Obviously the rheology modifier needs to be easy to use and can not interfere with coating performances.

RHEOLATE® 125, an alkali swellable emulsion (ASE), has been designed to obtain these described requirements.

Key properties

- Stable viscosity over a wide pH range as of 7
- Highly shear thinning flow profile for excellent atomization and sedimentation control
- High low shear viscosities for outstanding sag stability in coatings and body viscosity in putties
- Quick viscosity recovery for good sag control
- Excellent circulation stability
- No interaction with passivation of Aluminum flake pigments allows good gassing control
- Reduced influence on film durability
- Low tendency to post thickening
- Easy to incorporate
- Compatible with other thickener types

Chemical and physical data

Composition	Proprietary acrylic dispersion in water
Appearance	Milky white liquid
Active content [%]	25%
pH value	ca. 3.0 to 4.0
Density [g/cm³]	ca. 1.01

Application

RHEOLATE® 125 builds full viscosity as of a pH value of approximately 7 in an standard PU/acrylic industrial coating system. It maintains its effectiveness through pH values of higher than 11. It may be added to the coating manufacturing process at nearly all stages. Other ASE grades, as also the market reference product shown in Figure 1, often require significantly more precise adjustment of pH after the addition. As displayed, RHEOLATE® 125, is a highly effective product, that does not lose effectiveness across a wide pH range.

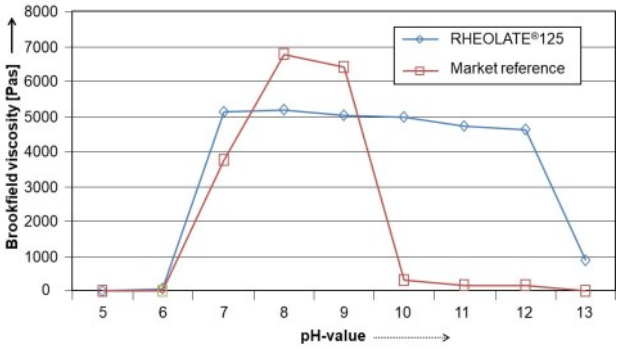

Figure 1: pH range applicable

The data in *Figure 2* are showing the flow characteristics of the PU acrylic industrial coating modified with RHEOLATE® 125 and a market reference acrylic thickener. Both rheology modifiers have been formulated at equal active content of 0.33%.

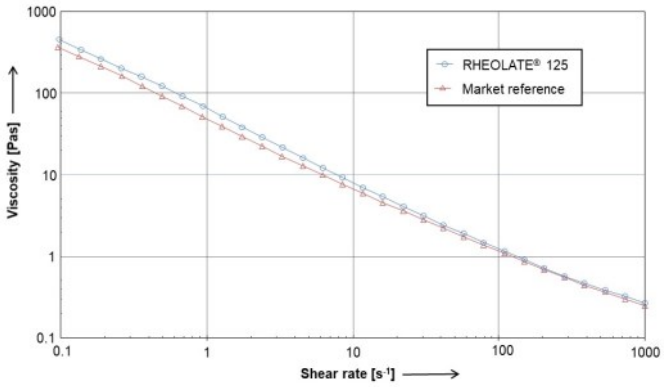

Figure 2: Flow characteristics

It becomes obvious that RHEOLATE® 125 provides at equal mid shear viscosity an even slightly stronger shear thinning flow than the commercially available market reference product.

Due to the strongly shear thinning flow, RHEOLATE® 125 is an ideal rheology modifier for aqueous industrial, spray applied coating systems.

As RHEOLATE® 125 provides very high viscosity values at low shear rates, it is an ideal thickener for putty systems, such as mastic tile adhesives (please refer to separate technical leaflet).

Also the stability of a system in a circulation system is of high importance for industrial coating systems. The results shown in Figure 3 display the effect on coatings equipped with both rheology modifiers, RHEOLATE® 125 and the market reference at cycles of low (0.1 s^{-1}) and high shear (100 s^{-1}) as it occurs in a ring line system.

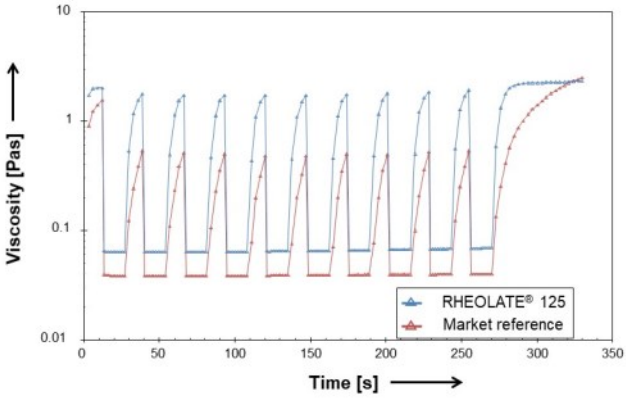

Figure 3: Circulation stability

RHEOLATE® 125 keeps the higher viscosity level, which was already seen in the rheology curves (Figure 2), over the large number of applied shear cycles in the simulation of the circulation.

Further, RHEOLATE® 125 is a famous rheology modifier in metal pigment containing coating systems. Especially, in combination with Hectorite clay grades, e.g. BENTONE® DE, an optimum metal control in order to obtain excellent optical properties, measured as flop indices, of metallic coating can be obtained. Relevant flop index data with a relevant water based base coat (WBBC) are shown in *Figure 4*.

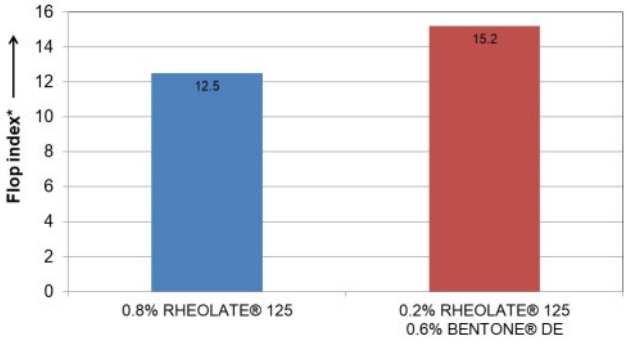

Figure 3 : Influence of flop indices

RHEOLATE® 125 used alone is already providing excellent optical properties. In the right combination with BENTONE® DE the flop values can be furtherly enhanced.

A similar result is achievable in case of combinations of RHEOLATE® 125 with our aqueous organic thixotrope grades THIXATROL® P 2100W and THIXATROL® 5020W.

Please refer for further information on this topic to the separately available technical literature.

Another very important parameter in the manufacturing of aqueous metal pigment containing coating systems is the control of gassing (*Figure 5*).

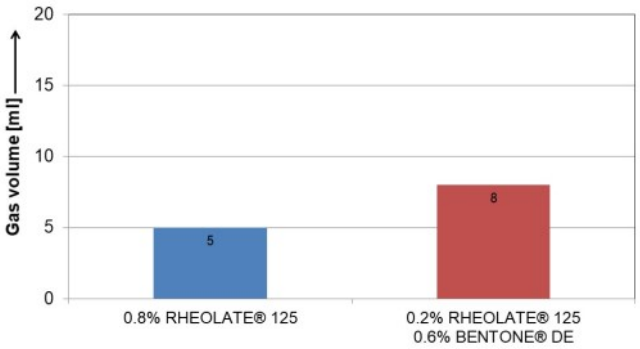

Figure 5: Gassing stability at 40°C

It becomes visible that both tested samples only produce a very low amount of gas over the test period. Both detected volumes remain far below the accepted maximum of 25 ml.

Conclusion

RHEOLATE® 125 is a very effective low shear thickener for aqueous industrial, sprayable coating systems. It furtherly finds use in other market segments, e.g. putty systems for construction application. RHEOLATE® 125 provides superb sag stability and pigment suspension. It also causes no tendency to post viscosity rise after correct activation.

In terms of the activation, RHEOLATE® 125 provides stable viscosity build over a wide range of pH as already of a value of 7.

The provided strongly shear thinning flow character allows excellent sprayability and atomization. In further application excellent application properties can be obtained.

Especially in combination with other thickener technologies such as Hectorite clay or aqueous organic thixotropes, excellent optical properties and flop indices of metallic coatings can be achieved. Also no adverse affect on the gassing stability could be noticed with RHEOLATE® 125.

Appendix

Formulations

Water based base coat (WBBC)

Raw material	Function	Concentration [%]
Daotan VTW 1262	Resin	39.00
Demin. water	Solvent	44.40 - X
Butylglycol	Co-solvent	0.70
n-Butanol	Co-solvent	1.30
DMEA (10%)	pH-adjustment	2.50
Rheological additive	Rheological additive	X
Aluminium-slurry	Effect	12.10
Total		100.00

Aluminum pigment slurry

Raw material	Function	Concentration [%]
Stapa IL Hydrolan 8154	Al-pigment	43.80
Butylglycol	Co-solvent	38.8
NUOSPERSE® W 30	Dispersing agent	4.1
n-Butanol	Co-solvent	13.3
Total		100.0

Test methods

Rheology measurements

Determined using the Anton-Paar MCR 301 rheometer, equipped with PP 50 measuring geometry at a gap width of 1 mm, at a temperature of 23°C.

Gassing stability

A 250 ml sample of the WBBC is filled into the gas washing bottle (300 ml). The bubble counter is attached to the gas washing bottle. The lower chamber of the bubble counter is filled with 25 ml water through the side neck. The assembled apparatus is placed in a 40 °C bath and allowed to reach equilibrium for 30 minutes. When a constant temperature is established, the screw cap has to be securely tightened

The volume of water displaced from the lower chamber equals the volume of gas (hydrogen) generated. 25 ml of generated gas in 30 days is the maximum acceptable level

Flop index

Measured with MA 68 XX from X-Rite acceptable level

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