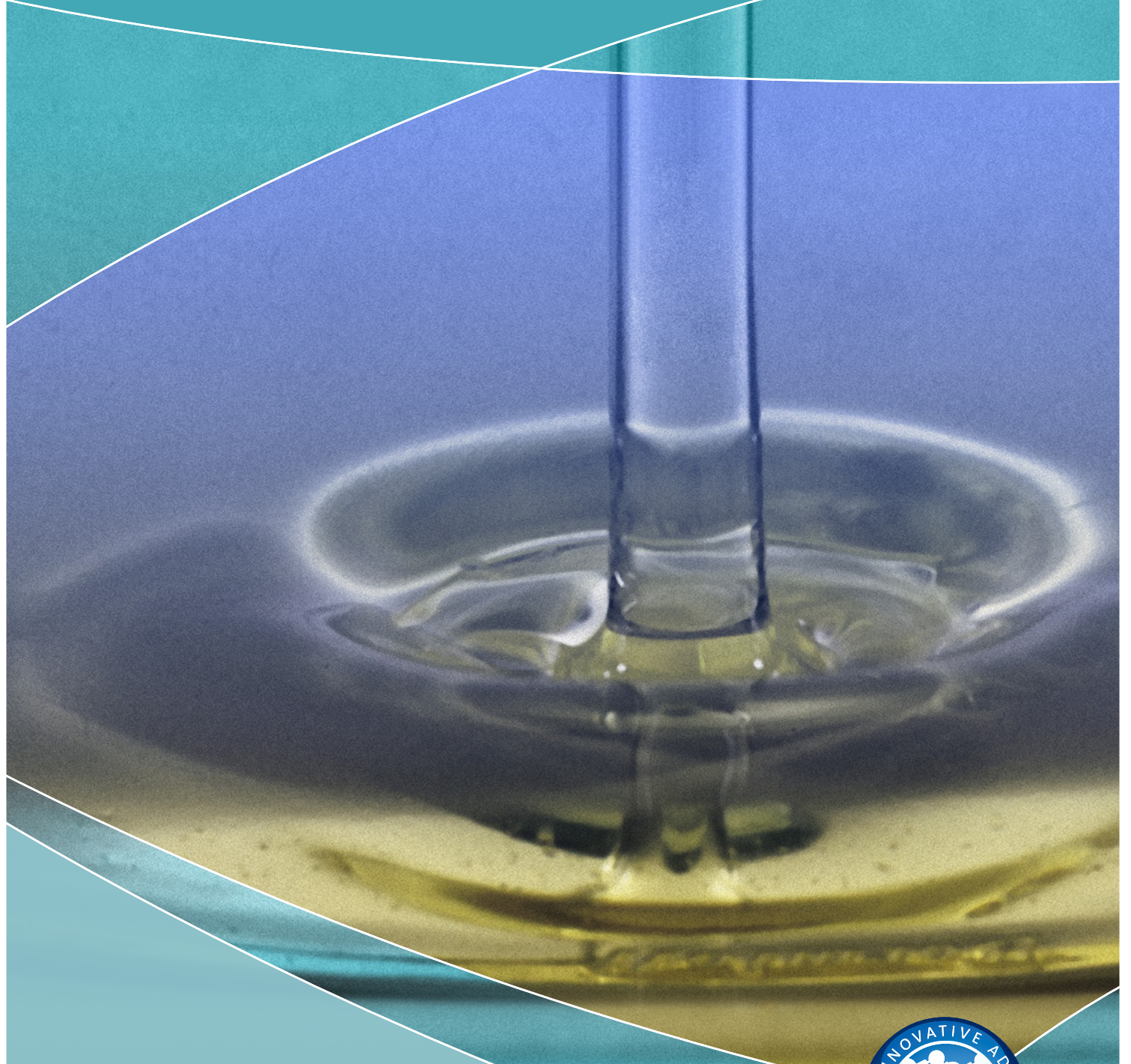


# OPTIFLO<sup>®</sup>

ASSOCIATIVE THICKENER FOR  
AQUEOUS SYSTEMS



**ROCKWOOD**  
ADDITIVES



## OPTIFLO® – Products and Applications

The OPTIFLO® family of thickeners has been designed to offer formulators broad formulating latitude in paints, coatings, inks, sealants, caulks, and adhesives while alleviating many of the problems often encountered with conventional urethane based thickeners. OPTIFLO® products impart excellent flow and leveling, high film build, excellent stability, and unsurpassed resistance to blister, spatter, and syneresis when used with a broad variety of latex binders including large and small particle size acrylics, vinyl acrylics, styrene acrylics, and ethylene vinyl acetates (EVA's). While the use of OPTIFLO® thickeners can eliminate or reduce the need for cellulosics, OPTIFLO® products are more compatible with cellulosics than urethane based thickeners leading to reduced paint syneresis and curtain sagging.

### **OPTIFLO® HEAT (Hydrophobic Ethoxylated Aminoplast Technology) Polymers**

- ◆ Non-ionic and emulsifier-free
- ◆ Low odor and water clear
- ◆ Products to meet all shear ranges
- ◆ Creates excellent brush drag
- ◆ Reduces spattering
- ◆ Does not affect acceptance of tint pastes
- ◆ Pseudoplastic/thixotropic behavior to prevent settling

### **OPTIFLO® HEUR (Hydrophobic Ethoxylated Urethane) Polymers**

- ◆ Nonionic and emulsifier-free
- ◆ Typical HEUR odor and clarity
- ◆ Designed for high shear viscosity range for EVA, Vinyl, Acrylic, and low responsive systems
- ◆ Suitable for exterior coatings

### **OPTIFLO® HEAT technology in paints and lacquers:**

- ◆ Increased resistance (to water, alcohol, liquid cleansers, etc.)
- ◆ Improved barrier effect
- ◆ Improved viscosity stability with tinting pastes
- ◆ Increased stability with respect to pH fluctuations
- ◆ No syneresis and improved storage stability
- ◆ No reduction in gloss
- ◆ Haze-free

### **Viscous properties**

Use OPTIFLO® whenever you need effective brush drag. OPTIFLO® increases viscosity, which primarily serves to improve spatter resistance. Because OPTIFLO® have no yield point, they generate superior leveling characteristics in paints.

	OPTIFLO® Standard Products									OPTIFLO® Specialty Products	
	L 100	L 150	H 370	H 380-VF*	H 400	H 600/E*	H 600-VF	TVS	TVS-VF	M2600	M2600-VF
▲ = recommended ○ = suitable											
Industrial paints	▲	▲	○	▲	▲	○	○		▲	▲	▲
Wood lacquers a. varnishes	○	○	○	▲						○	▲
Furniture finishes	▲	▲		○	▲	○	○				
UV-curing parquet varnishes										▲	○
Paints for artists	○	○	▲	▲		○	○	▲	○	○	○
Latex paints	▲	○	○	▲		○	○	○	▲	○	▲
Pigment pastes	○	○	○	○				▲	▲		
Metallic finishes	▲	▲	▲	○		○	○				
Printing inks	▲	▲			○						
Latex plasters	○	○				▲	▲	○			
Coloured sandstone plasters	○	○				▲	▲	○			
<b>Special applications</b>											
Adhesives	○	○	○		▲	▲	▲			○	
Textile auxiliaries						▲	▲				
Textile dyes	○	○			▲						
Window paints	▲	▲		○							▲

\*) Available in Europe only

## Structure of OPTIFLO®

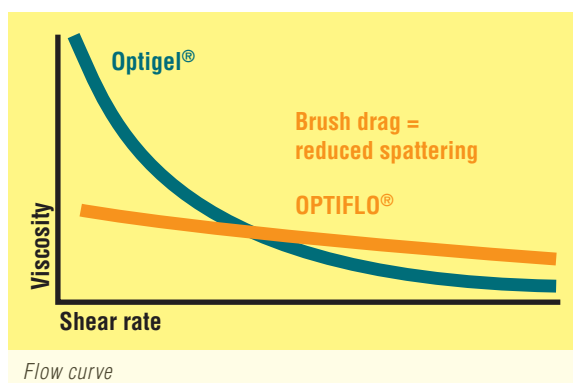
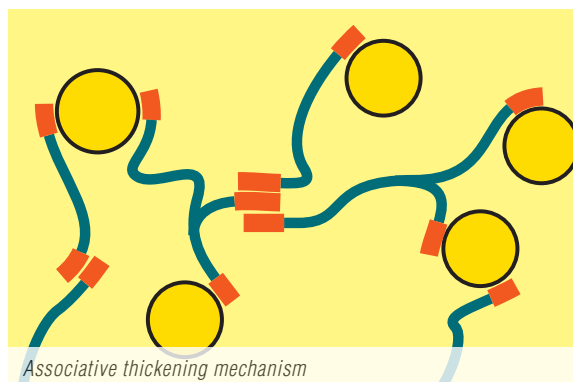
OPTIFLO® is a water-soluble, associative polymer thickener. OPTIFLO® primarily consists of water-soluble polyethylene glycol, onto which a few non-water-soluble (hydrophobic) molecules have been added via a patented aminoplast linkage. In aqueous solution, these hydrophobic molecules either group together to form micelles or associate with other hydrophobic components, such as latex particles.

The long polyethylene oxide backbone remains dissolved in water, where it links micelles and latex particles into a network – this is what raises the viscosity. The more (finely divided) latex particles there are that can associate with the hydrophobic modules, the greater the thickening effect. Hence the term “associative” thickening.

### How it works

When the interactions described above form a three-dimensional network, associative thickeners greatly increase viscosity, especially under high-shear conditions. This strengthens the internal structure and thickens the material to a honey-like consistency, a process also described as brush drag. The number and chemical nature of the hydrophobic groups in the thickener molecule determine whether the increase in viscosity that can be achieved will produce Newtonian or thixotropic/pseudoplastic behavior.

Unlike systems utilizing laminar silicates (Optigel®) to produce thixotropic behavior, systems thickened with OPTIFLO® have no yield point, which ensures superior paint flow and levelling following application.



## OPTIFLO® Additives in Decorative Systems

Applying paints using a brush or roller places special demands on the rheology of coating systems, particularly with water-based paints. This is especially true for decorative applications, where products are applied primarily by brush or roller.

Unlike other methods, such as spraying, pouring or dipping, this type of manual application requires paint to have certain unique rheological properties. The reduction of viscosity under shear needs to be influenced and kept within certain limits. Otherwise, the paint will lack the inner tenacity at high-shear conditions which will result in extremely thin coatings. Consequently, the paint coverage will be either poor or insufficient, potentially requiring numerous coats.

Due to the chemical structure, rheological additives such as laminar silicates have very little affect on this phenomenon. As a result, they are only effective under low-shear conditions, which consequently lend to the paint's thixotropy and/or pseudoplastic properties. The result is a necessity for a different approach to elevate the viscosity at high shear rates (typically in the range of  $10,000 \text{ s}^{-1}$ ).

Associative thickeners designed to achieve brush drag in aqueous mediums have the ability to form bonds (associations) with binder particles, pigments, fillers or even with themselves. The network that results from these links is stable even in high shear conditions, thereby generating effective brush drag.

Forming a homogenous network within the paint and within the paint film after application will quickly make the dried coating water resistant.

**OPTIFLO® in a satin VAE formulation with 3% universal colorant showing an elimination of colour float vs a competitive HEUR thickener.**



**Phthalo Blue** – Left:Competitive – Right: OPTIFLO®



**Red Iron Oxide** – Left:Competitive – Right: OPTIFLO®



**Lamp Black** – Left:Competitive – Right: OPTIFLO®

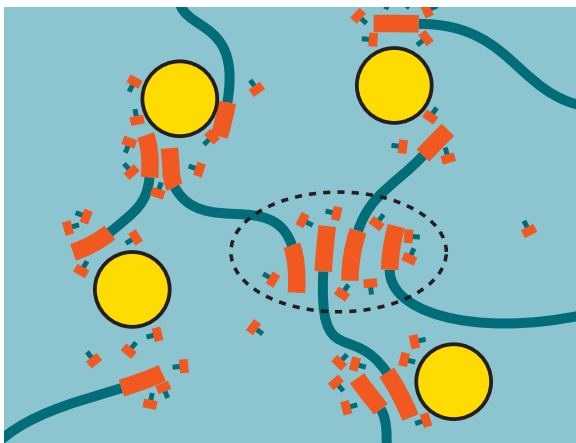
## OPTIFLO® ADDITIVES for Tinting Paste Systems

Associative thickeners are often sensitive to the addition of surfactants, dispersing agents, wetting agents, and solvents. These additives reduce the associative interactions between the latex particles and the hydrophobic modules of the thickener, thereby reducing viscosity. This problem primarily arises when adding pigment concentrates which contain large amounts of interfering agents, such as dispersants and surfactants. Our OPTIFLO® TVS (Tinting Viscosity Stabilizer) thickener has been specially designed to address this issue. Due to the unique opportunities afforded by aminoplast technology, OPTIFLO® TVS contains an unusually high number of strongly hydrophobic modules, making it less sensitive to these interferents. OPTIFLO® TVS is especially suitable for base paints tinted with pigment concentrates.

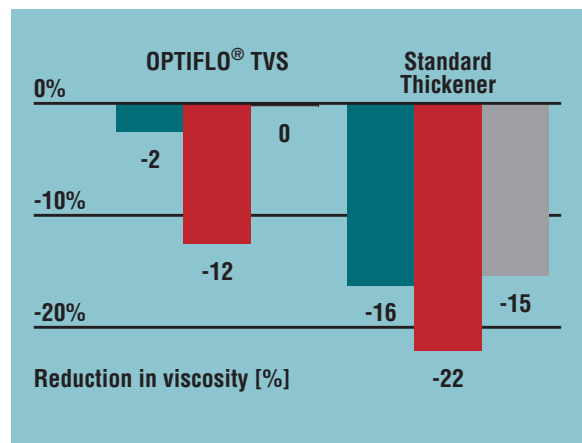
### Conclusions

Over the years the Paint and Coatings Industry has adopted environmental regulations to lower VOC (Volatile Organic Content) emissions in architectural coatings. As a result, paint manufacturers are moving from traditional oil-based paint systems to water-based paint systems. The challenge for the paint manufacturer is to maintain performance properties such as brushability, stain removal and durability.

The OPTIFLO® thickener system introduced in 1997 was designed for the paint manufacturer for use in latex or water-based paints to provide a smooth creamy paint consistency with buttery like brush feel while preventing roller spatter (splashing that can occur from the paint roller). In addition, a novel patented technology was recently developed which will allow all OPTIFLO® products to be supplied VOC free, this technology known as OPTIFLO® VF Technology, will also further enhance the quality of the paint in areas such as color uniformity and paint consistency (less separation).



Reduction in viscosity when surfactants are added 10 systems using a standard thickener.

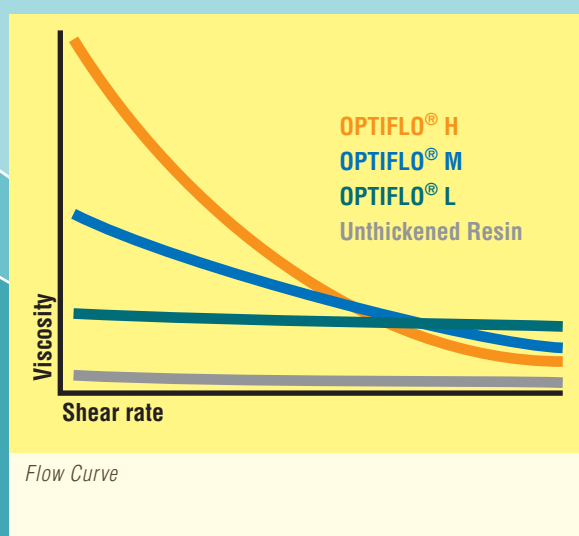


OPTIFLO® TVS in a semi-gloss latex paint. Very little loss in viscosity is observed when tinting with an universal pigment paste (phthalocyanine blue, iron oxide red, lamp-black).

## OPTIFLO® Product Overview

OPTIFLO® Formulations				
Standard Products	Rheology	Solids [%]	Dissolved in	Comments
OPTIFLO® L 100	Highly Newtonian	20	Water	HEAT/No VOCs
OPTIFLO® L 150	Highly Newtonian	20	Water	HEAT/No VOCs
OPTIFLO® H 370	Pseudoplastic / thixotropic	20	Water / BDG	HEAT
OPTIFLO® H 400	Pseudoplastic / thixotropic	20	Water / BDG	HEAT
OPTIFLO® H 380-VF*	Pseudoplastic / thixotropic	40	Water	HEAT/No VOCs
OPTIFLO® H 600/E*	Pseudoplastic / thixotropic	20	Water / BDG	HEAT
OPTIFLO® H 600-VF	Pseudoplastic / thixotropic	43	Water	HEAT/No VOCs
OPTIFLO® TVS	Pseudoplastic / thixotropic	17,5	Water / BDG	HEAT
OPTIFLO® TVS-VF	Pseudoplastic / thixotropic	40,5	Water	HEAT/No VOCs
Specialities				
OPTIFLO® M 2600	Pseudoplastic / thixotropic	25	Water / BDG	HEUR
OPTIFLO® M 2600-VF	Pseudoplastic / thixotropic	40	Water	HEUR/No VOCs

\*) Available in Europe only



### OPTIFLO® Additives in Formulations

Three basic types of OPTIFLO® products are available: OPTIFLO® L, M and H

- ◆ The thickening behavior of OPTIFLO® L products is largely Newtonian.
- ◆ The thickening behavior of OPTIFLO® M products is slightly pseudoplastic.
- ◆ OPTIFLO® H products, on the other hand, are very pseudoplastic.

Regardless of grade, all OPTIFLO® products have excellent thickening properties, particularly at high shear rates.



**ROCKWOOD**  
ADDITIVES

**Rockwood Additives Limited, Rockwood Clay Additives GmbH, Rockwood Specialties (Singapore) Pte. Limited and Southern Clay Products, Inc. are wholly owned subsidiaries of Rockwood Specialties Group, Inc.**

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