Contacts worldwide

Asia
BASF East Asia Regional Headquarters Ltd.
45/F, Jardine House
No. 1 Connaught Place
Central
Hong Kong
formulation-additives-asia@basf.com

Europe
BASF SE
Formulation Additives
67056 Ludwigshafen
Germany
formulation-additives-europe@basf.com

North America
BASF Corporation
11501 Steele Creek Road
Charlotte, NC 28273
USA
formulation-additives-nafta@basf.com

South America
BASF S.A.
Rochaverá - Crystal Tower
Av. das Nações Unidas, 14.171
Morumbi - São Paulo-SP
Brazil
formulation-additives-south-america@basf.com

Additives for Thermoset Composites
Formulation Additives by BASF

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BASF SE
Formulation Additives
Dispersions & Pigments Division
67056 Ludwigshafen
Germany
www.basf.com/formulation-additives

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Europe, March 2019
We create chemistry
Leveling is defined as the ability of a coating to flow out after application in order to reduce any surface irregularities such as brush and roller marks, orange peel, peaks or craters.

**Good to know**

*Orange peel* is a surface bumpiness or waviness that is often caused by poor leveling and resembles skin of an orange.

BASF serves the composites industry with three major classes of wetting agents and surface modifiers which includes products based on polysiloxanes, polyacrylates and fluorinated polyacrylates. The properties of wetting agents and surface modifiers by chemistry are illustrated in Figure 13.

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**BASF**

is the world’s leading chemical company and a premier provider of innovative solutions for the paints and coatings industry. BASF offers virtually every ingredient needed to make high-quality coatings and has the know-how to solve formulation challenges and support the development of new coating concepts. Our portfolio encompasses dispersions, pigments, resins and a broad range of additives such as light stabilizers and formulation additives.

When it comes to formulation additives, BASF offers a strong portfolio of industry-leading products that help to enable sustainable and performance-driven solutions. Our offer is comprised of the broadest technology base of dispersing agents, wetting agents, surface modifiers, defoamers, rheology modifiers and film-forming agents.

We prioritize our understanding, listening and collaboration skills to serve our customers’ needs. With global manufacturing capabilities, a strong research and development platform, full-service regional technical laboratories, pre-screening capabilities and a team of experienced and knowledgeable experts, BASF can help make your coatings better and your business more successful.

This brochure has been developed to give composites and gelcoat producers, molding companies and assemblers first-hand guidance on the use of formulation additives from BASF and on making the most out of their performance characteristics.

Looking for innovative solutions where little helpers make all the difference for your high-quality composites?

**BASF – We create chemistry**
Additives for Thermoset Composites
Formulation Additives by BASF

Table of Contents

Composites: An Introduction .......................... 3
Manufacturing Processes for Thermoset Composites .......... 4
BASF Formulation Additives for Composites ............... 8
• Air Release Agents .................................... 10
• Dispersing Agents .................................... 12
• Wetting Agents and Surface Modifiers .................. 14

Composites: An Introduction

Composites materials are clearly established in nearly all
significant economic sectors. Innovative developments for new
applications, or as substitutes for metallic alloys, are key
elements in demanding markets like aerospace, automotive,
energy, sports and military.

Traditional composites typically consist of combinations of
different components:

Matrix is generally a thermosetting resin as unsaturated
polyesters or epoxies that binds the reinforcement together,
keeps it firmly in place and protects it from environmental
influences.

Reinforcements are usually in the form of fibers or particles
that enhance the mechanical and physical properties of the
parts.

Fillers and pigments are used to enhance coloristic and other
physical properties. Fillers are typically the least expensive
components of major ingredients. They improve functional
properties such as water and temperature resistance and can
help control shrinkage.

Formulation Additives are applied to optimize composite
properties like shrinkage, rheology, flow and wetting behavior
and adhesion.

Additives are used in low quantities by weight but help improve
the cost performance ratio of the final composite part.

As composite materials can be tailored to meet specific needs,
several properties like strength, stiffness, weight, aesthetics,
resistance to corrosion and chemical stability can be
considerably improved through proper choice of additives.

Finding accurate raw materials is one of the most important
steps for developing the ideal composite part. Commonly used
raw materials for composite formulations are shown in
Figure 1.

Figure 1: Example formulation components for thermoset composites.
Manufacturing Processes for Thermoset Composites

The matrix nature, reinforcement type and the designated end application of the designed composite part are crucial selection elements for the fabrication process. The basic manufacturing methods used to fabricate composites include: lay-up, spray-up, filament winding, pultrusion and resin transfer molding. The major fabrication routes for thermoset composites are shown in Figure 2.

**SMC/BMC/TMC (Sheet/Bulk/Thick Molding Compounds):**
SMC, BMC and TMC are premixes made up of thermoset resins, mineral fillers and additives. The compounds are further formed into complex shapes through high volume injection or compression molding processes at high temperatures of around 150°C. The resulting composite parts compete with steel parts in their mechanical properties, ensure pronounced chemical and, corrosion resistance and allow very high design freedom.

**Figure 2:** Fabrication routes for thermoset composites

**SMC**
- Fiber content: 10-60%
- Fiber length: 25-50 mm
- Characteristics: Superior mechanical properties due to the longer fibers

**BMC**
- Fiber content: 10-30%
- Fiber length: 6-12 mm
- Characteristics: Better flow and temperature resistance than SMC due to the shorter fibers and higher filler content

**TMC**
- Fiber content: 10-20%
- Fiber length: 12-50 mm
- Characteristics: Combined properties of BMC (good flow) and BMC (best mechanical properties)

**Figure 3:** Composition and characteristics of SMC/BMC/TMC compounds
Additives for Thermoset Composites
Manufacturing Processes for Thermoset Composites

**Hand Lay-up**
Hand lay-up consists of manual positioning of fiber-reinforced mats or prepreg plies onto a prepared mold. Thermosetting resins are then applied by brushing, spraying, or resin infusion. Entrapped air can be removed with the aid of rolling, and the laminate can be left to dry at room temperature. Curing can be accelerated in ovens or by vacuum. Hand lay-up is a simple and relatively low-cost processing method for large components such as wind turbine parts and boats.

**Spray Lay-up**
Spray lay-up is a conventional open mold process. Gelcoat is applied as a first layer onto a previously waxed mold and then cured. Chopped reinforcements and thermoset resins are then sprayed onto the mold and left to cure at room temperature in ovens or autoclaves. Spray lay-up allows more shape complexity and a quicker production time than hand lay-up. This process is suitable for large components with less complex geometries such as boats and bath tubs.

**Filament Winding**
Filament winding refers to the winding of thermoset resin impregnated fiber rovings under tension around a rotating mandrel. These fabricated circular composite products with a hollow core are then cured at room temperature or in ovens and used in applications where weight, chemical resistance, pressure, and temperature are important concerns. Pipelines, tanks, and vessels are example applications of filament winding produced composite parts.

**RTM (Resin Transfer Molding)**
RTM is a vacuum-assisted closed mold process. Fiber reinforcements are positioned in a matched male and female mold, which is then closed and clamped. The matrix is injected under pressure until the mold is filled. The parts cured in the mold are normally heated by controller. RTM is a fast and clean process to produce composites with large surface areas, complex shapes and smooth finishes like boat hulls and wind turbine blades.

**Pultrusion**
Pultrusion is a high-volume production process for composite profiles. Reinforcement materials (long fibers, mats or fabrics) are pulled and guided through a bath of matrix for impregnation, passed through a heated die for curing and cut at the end of the line into various tubes and flat sheets with excellent mechanical and chemical properties.
Additives for Thermoset Composites

Formulation Additives by BASF

Formulation additives are essential formulation components of composite materials. They are used to optimize the matrix properties and adapt the reinforcements for particular applications. Additives stabilize pigments and fillers to prevent their sedimentation in composite formulations. They also improve the flow, slip and rheology behavior and contribute to proper fiber wetting. Formulation additives are significant raw materials which enhance the quality of the laminate’s finish and extend the product durability of the composite parts.

BASF offers a number of solutions for the composites industry and a wide range of formulation additives including air release agents, low to medium molecular weight dispersing agents, high molecular weight dispersing agents and wetting agents, and surface modifiers.

### Nomenclature

**Efka® PB:**
Polymer based defoamers

**Efka® SI:**
Silicone based defoamers

**Dispex® Ultra FA / Efka® FA:**
Low molecular weight dispersing agents

**Efka® PU:**
Polyurethane based dispersing agents

**Efka® PX:**
Controlled or advanced polymers

**Efka® PA:**
Polyacrylic based dispersing agents

**Efka® SL:**
Slip and mar agents

**Efka® FL:**
Flow and leveling agents

### Typical Epoxy Glass Fiber - SMC Composition

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy System</td>
<td>60%</td>
</tr>
<tr>
<td>Additives</td>
<td>24%</td>
</tr>
<tr>
<td>Inorganic Filler</td>
<td>15%</td>
</tr>
<tr>
<td>Glass Fiber</td>
<td>1-3%</td>
</tr>
</tbody>
</table>

### Typical Gelcoat Composition

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP Resin</td>
<td>10 parts</td>
</tr>
<tr>
<td>Pigments and Fillers</td>
<td>3 parts</td>
</tr>
<tr>
<td>Accelerator</td>
<td>1-3 parts</td>
</tr>
<tr>
<td>Pesticide</td>
<td>100 parts</td>
</tr>
</tbody>
</table>

**Figure 4:** Formulation additives content in typical composite formulations

BASF offers a number of solutions for the composites industry and a wide range of formulation additives including air release agents, low to medium molecular weight dispersing agents, high molecular weight dispersing agents and wetting agents, and surface modifiers.
Matrices used in compound formulations and gelcoats often include soluble impurities as surface active substances that stabilize entrapped air during the processing and application of the parts.

Entrapped and stabilized air remains as micro- or macro-foam in the system after curing and can be a considerable source of porosity, weak points, insufficient fiber wetting and poor mechanical properties in composite materials.

Removing incorporated air from the mostly highly viscous systems make the use of air release agents imperative.

Air release agents take effect by destroying foam or preventing its formation, enabling coalescence of air bubbles, increasing their diameter and making them rise easily to the surface and collapsing.

Depending on the application and customer needs, BASF offers a complete range of air release agents for thermoset resins-based composite formulations. The products are based on a broad technology portfolio of polysiloxanes, polyacrylates and/or other organic polymers.

**Good to know**

Different denominations like “defoamer”, “antifoaming agent” or “air release agent” are used interchangeably to describe products designed to control or prevent foaming. The distinction between the different terms is blurred since most foam controlling products can serve all three roles.
**Dispersing Agents**

The use of dispersing agents results in reduced viscosity, increased filler and pigment loading, improved color strength and a stable dispersion of the compound.

The dispersing process takes place in three steps: **wet**ting of the particle surface by the surrounding liquid; **break-down** of the particle agglomerates using high shear mixers; and **stabilization** of the finely milled pigments.

Insufficient stability might provoke flocculation that leads to an increase in particle size, loss of gloss and color strength and to a settling tendency. A side effect is a higher viscosity that precludes reasonable fiber wetting.

For unsaturated polyester-based composites, control of shrinkage control is an important factor. The shrinkage of the pure resin and styrene increases the internal stress of the molded parts and causes surface waviness, geometry changes and crack formation in the composites part.

For this reason, resin incompatible low-shrink additives are very often used in, for example, SMC/BMC compounds and have to be stabilized. Commonly used shrink control technologies used in UP resins are shown in Figure 9.

**Figure 8:** Wetting, agglomerate break-down and pigment stabilization process

**Figure 9:**

- **LDPE (Low density polyethylene)**
  - Less crack formation in composite parts
- **LS (Low shrink formulations)**
  - PS, HIPS (high-impact polyethylene), PMMA
  - Dimension stability
  - Lower internal stress
- **LP (Low profile formulations)**
  - PVA and UP in Styrene
  - High shrink control
  - Class A surfaces coating without surface treatment

**Figure 10:**

BASF high molecular weight dispersing agents comprise a high number of anchoring groups along the polymer backbone. The resin-like character allows for excellent compatibility with both the UP resin and the shrink control agents enhancing homogeneity and stabilization of the compounds. Figure 10 shows the stabilization effect of Efka® PU 4061 in an LS formulation.
Wetting Agents & Surface Modifiers

Substrate wetting and the profile of the cured surface of composite materials depend heavily on the nature of the substrate, surface tension of the compounds and coating applied on the top of the parts.

Wetting agents and surface modifiers are often used in composite systems to balance surface tension differences as well as to prevent surface defects such as bad substrate wetting, fish eyes, leveling or slip-related effects.

### Substrate wetting

- **Main influencing factors**
  - Compound's surface tension
  - Substrate's surface tension
- **Related defects**
  - Craters, edge crawling, de-wetting, fish eyes

### Leveling

- **Main influencing factors**
  - Compound's rheology
  - Compound's surface tension
- **Related defects**
  - Orange peel, waviness, pinholes, decreased gloss

### Slip

- **Main influencing factors**
  - Additives chemistry and its positioning within the compound
- **Related defects**
  - Blocking, decreased mar resistance, intercoat adhesion

**Figure 11:**

Theoretical aspects of substrate wetting, leveling and slip
BASF’s Formulation Additives Focus Portfolio for Composites

**BMC / TMC**
- **Shrink Additives Stabilisation**
  - Efka® PU 4061 / Efka® PU 4010
- **Viscosity Reduction**
  - Efka® FA 4610 / Efka® FA 4611 / Efka® FA 4620

**Pultrusion**
- **Air Release**
  - Efka® PB 2020 / Efka® PB 2720 / Efka® PB 2744
- **Anti-Sedimentation**
  - Efka® FA 4647 / Efka® FA 4665
- **Anti-Separation**
  - Efka® PU 4061 / Efka® PU 4010
- **Fiber Wetting and Deaeration**
  - Efka® PB 2020 / Efka® PU 4061
- **Viscosity Reduction**
  - Efka® FA 4610 / Efka® FA 4611 / Efka® FA 4620

**SMC**
- **Anti-Separation**
  - Efka® PU 4061
- **Fiber Wetting and Deaeration**
  - Efka® PB 2020 / Efka® PU 4063
- **Wetting and Dispersing**
  - Efka® FA 4610 / Efka® FA 4611 / Efka® FA 4620

**Gelcoats**
- **Air Release**
  - Efka® PB 2020 / Efka® PB 2720
- **Flooding / Floating**
  - Efka® PA 4401 / Efka® PX 4300
- **Flow / Leveling**
  - Efka® FL 3785 / Efka® SL 3033
## Additives for Thermoset Composites

### Air Release Agents

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Features</th>
<th>Unsaturated Polyester</th>
<th>Epoxies / Polyurethanes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Polymer based Air Release Agents</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® PB 2001</td>
<td>Brings fast de-aeration even in viscous compounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® PB 2010</td>
<td>Most suitable air release agent for transparent systems up to medium thicknesses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® PB 2020</td>
<td>Brings fast de-aeration while increasing wetting (e.g. towards fibres), even in viscous compounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® PB 2720</td>
<td>Most efficient air release agent combined with broad applicability. Suitable for pigmented compounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® PB 2744</td>
<td>Ultra low VOC de-aerator with excellent and fast performance agent micro and macro foam</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Silicone based Air Release Agents</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® SI 2040</td>
<td>Designed for ambient cured systems and low shear forces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® SI 2722</td>
<td>Efka® SI 2722 can be used in pigmented or non-pigmented resin systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® SI 2723</td>
<td>Low odour version of Efka® SI 2722</td>
<td></td>
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</table>

### Substrate Wetting Agents and Surface Modifiers

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Features</th>
<th>Unsaturated Polyester</th>
<th>Epoxies / Polyurethanes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fluorinated Polyacrylates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® FL 3277</td>
<td>Provides additional substrate wetting as well as anti-cratering over straight polyacrylate additives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Straight Polyacrylates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® FL 3740 EH</td>
<td>Flow agent with higher de-aeration properties compared to Efka® FL 3741</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® FL 3741</td>
<td>Highly compatible flow agent with additional air release effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® FL 3778</td>
<td>Brings leveling without slip, supports the action of air release agent Efka® PB 2720</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® FL 3785</td>
<td>Brings leveling, no slip and contributes to deaeration</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Modified Polysiloxanes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® SL 3031</td>
<td>Slip &amp; leveling agent with good substrate wetting and anti-cratering properties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® SL 3033</td>
<td>Slip &amp; leveling agent with good substrate wetting and anti-cratering properties</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® SL 3035</td>
<td>Leveling agent with moderate slip</td>
<td></td>
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</tr>
<tr>
<td>Efka® SL 3200</td>
<td>Solvent-free slip and leveling agent with a strong reduction of surface tension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efka® SL 3236</td>
<td>Slip &amp; leveling agent with additional air release effect</td>
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<td></td>
</tr>
</tbody>
</table>
### Low molecular weight dispersing agents

**Additives for Thermoset Composites**

#### Applications

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dispex Ultra® FA 4420</strong></td>
<td>Increases colour acceptance of inorganic pigments</td>
</tr>
<tr>
<td><strong>Dispex Ultra® FA 4425</strong></td>
<td>Increases colour acceptance and reduces floatation</td>
</tr>
<tr>
<td><strong>Dispex Ultra® FA 4431</strong></td>
<td>For fillers, Possible fluidizing by post addition</td>
</tr>
<tr>
<td><strong>Efka® FA 4610</strong></td>
<td>Standard choice for fillers and inorganic pigments (e.g. 200 phr of CaCO3). Antisettling properties are inherent</td>
</tr>
<tr>
<td><strong>Efka® FA 4611</strong></td>
<td>Broad compatibility in a wide range of resin systems. Very efficient in wetting and dispersing of titanium dioxide and other inorganic pigments. High pigment and filler loading possible. Strong reduction of mill base viscosity</td>
</tr>
<tr>
<td><strong>Efka® FA 4620</strong></td>
<td>For inorganic pigments and fillers in cobalt catalyst free compounds. Able to wet 275 phr of ATH. Same anchoring group as Efka® FA 4612. Antisettling properties are inherent</td>
</tr>
<tr>
<td><strong>Efka® FA 4644</strong></td>
<td>For fillers such as ATH or CaCO3. Antisettling properties are inherent</td>
</tr>
<tr>
<td><strong>Efka® FA 4647</strong></td>
<td>For fillers in fibre-reinforced thermosetting systems. Antisettling properties are inherent</td>
</tr>
<tr>
<td><strong>Efka® FA 4665</strong></td>
<td>For fillers and inorganic pigments. Prevents settling and improves color separation. Antisettling properties are inherent</td>
</tr>
<tr>
<td><strong>Efka® FA 4666</strong></td>
<td>For fillers and inorganic pigments. Prevents settling and improves color separation. Efka® FA 4666 can be used in pastes. Antisettling properties are inherent</td>
</tr>
<tr>
<td><strong>Efka® FA 4672</strong></td>
<td>For inorganic pigments and extenders such as talc, ATH and quartz</td>
</tr>
</tbody>
</table>

#### Applications

<table>
<thead>
<tr>
<th>Gelcoat</th>
<th>Pultrusion</th>
<th>Gelcoat</th>
<th>Pultrusion</th>
<th>Flooring/Lining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gelcoats</td>
<td>SMC/BMC</td>
<td>Pultrusion</td>
<td>Casting</td>
<td>Laminating</td>
</tr>
</tbody>
</table>

#### Features

- Increases colour acceptance of inorganic pigments
- Increases colour acceptance and reduces floatation
- For fillers, Possible fluidizing by post addition
- Standard choice for fillers and inorganic pigments (e.g. 200 phr of CaCO3). Antisettling properties are inherent
- Broad compatibility in a wide range of resin systems. Very efficient in wetting and dispersing of titanium dioxide and other inorganic pigments. High pigment and filler loading possible. Strong reduction of mill base viscosity
- For inorganic pigments and fillers in cobalt catalyst free compounds. Able to wet 275 phr of ATH. Same anchoring group as Efka® FA 4612. Antisettling properties are inherent
- For fillers such as ATH or CaCO3. Antisettling properties are inherent
- For fillers in fibre-reinforced thermosetting systems. Antisettling properties are inherent
- For fillers and inorganic pigments. Prevents settling and improves color separation. Antisettling properties are inherent
- For fillers and inorganic pigments. Prevents settling and improves color separation. Efka® FA 4666 can be used in pastes. Antisettling properties are inherent
- For inorganic pigments and extenders such as talc, ATH and quartz

### High molecular weight dispersing agents

#### Applications

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Efka® PA 4401</strong></td>
<td>Efka® PA 4401 is a polymeric dispersant for stabilising inorganic and organic pigments in high quality systems</td>
</tr>
<tr>
<td><strong>Efka® PA 4402</strong></td>
<td>Conventional for all standard inorganic and organic pigments (e.g. Irgalite® range); suited for colourants (higher pigment loading)</td>
</tr>
<tr>
<td><strong>Efka® PU 4009</strong></td>
<td>Stabilizes TiO2 and standard organic pigments as found in our Irgalite® range</td>
</tr>
<tr>
<td><strong>Efka® PU 4010</strong></td>
<td>Stabilizes TiO2, matting agents and usual organic pigments. Improves and aug resistance in UPE</td>
</tr>
<tr>
<td><strong>Efka® PU 4047</strong></td>
<td>Stabilizes inorganic and organic pigments such as our Heliogen® Blue and Green and carbon black pigments</td>
</tr>
<tr>
<td><strong>Efka® PU 4050</strong></td>
<td>Stabilizes all kinds of pigments and is particularly effective with pigments such as our OPP® reds</td>
</tr>
<tr>
<td><strong>Efka® PU 4061</strong></td>
<td>Stabilizes TiO2, matting agents and usual organic pigments. Improved anti-separation effect in UPE</td>
</tr>
<tr>
<td><strong>Efka® PU 4063</strong></td>
<td>Stabilizes all kinds of pigments and is particularly effective with red pigments such as our OPP® reds</td>
</tr>
<tr>
<td><strong>Efka® PX 4300</strong></td>
<td>Efka® PX 4300 is a controlled polymer by the use against flooding, floating and flocculation in high quality systems and difficult organic pigments</td>
</tr>
<tr>
<td><strong>Efka® PX 4340</strong></td>
<td>Controlled polymer with higher efficiency towards pigment stabilization and viscosity reduction. Specific for high performance organic pigments (e.g. Palatex®, Cresophthal®, Inaguit®)</td>
</tr>
<tr>
<td><strong>Efka® PX 4701</strong></td>
<td>Efka® PX 4701 is made by Controlled Free Radical Polymerization. It provides a combination of strong viscosity suppression and excellent storage stability</td>
</tr>
<tr>
<td><strong>Efka® PX 4733</strong></td>
<td>Highly efficient dispersing agent which shows excellent performance in stabilizing organic pigments in low viscosity systems. It has been specifically developed to provide the challenging combination of strong viscosity suppression, excellent storage stability and improved color strength</td>
</tr>
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<td><strong>Efka® PX 4780</strong></td>
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#### Applications

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#### Features

- Efka® PA 4401 is a polymeric dispersant for stabilising inorganic and organic pigments in high quality systems
- Conventional for all standard inorganic and organic pigments (e.g. Irgalite® range); suited for colourants (higher pigment loading)
- Stabilizes TiO2 and standard organic pigments as found in our Irgalite® range
- Stabilizes TiO2, matting agents and usual organic pigments. Improves and aug resistance in UPE
- Stabilizes inorganic and organic pigments such as our Heliogen® Blue and Green and carbon black pigments
- Stabilizes all kinds of pigments and is particularly effective with pigments such as our OPP® reds
- Stabilizes TiO2, matting agents and usual organic pigments. Improved anti-separation effect in UPE
- Stabilizes all kinds of pigments and is particularly effective with red pigments such as our OPP® reds
- Efka® PX 4300 is a controlled polymer by the use against flooding, floating and flocculation in high quality systems and difficult organic pigments
- Controlled polymer with higher efficiency towards pigment stabilization and viscosity reduction. Specific for high performance organic pigments (e.g. Palatex®, Cresophthal®, Inaguit®)
- Efka® PX 4701 is made by Controlled Free Radical Polymerization. It provides a combination of strong viscosity suppression and excellent storage stability
- Highly efficient dispersing agent which shows excellent performance in stabilizing organic pigments in low viscosity systems. It has been specifically developed to provide the challenging combination of strong viscosity suppression, excellent storage stability and improved color strength
- Efka® PX 4780 is a high molecular weight dispersing agent designed to disperse and stabilise organic pigments and carbon blacks, especially where resin-matrix reactive dispersants are desired