

Dispersant for waterborne
pigment concentrates
DISPERSOGEN® PLF 100



An easier way to make **STABLE FORMULATIONS**

Pigment pastes can be a real pain to make. But not with Dispersogen® PLF 100 – because it's different.

One issue formulators often run into when preparing pigment concentrates is the foam formation that occurs when they grind pigments to break them up into smaller aggregates. Other problems can arise during dispersion and storage. Here, unwanted viscosity increases can make further dilution necessary, or sedimentation and syneresis can spoil the consistency of the paste.

These issues can make it hard to formulate pigment concentrates that fully satisfy paint manufacturers. They often stand in the way of giving pastes the color-strength they need to efficiently tint paints at small concentrations.

Dispersogen® PLF 100 offers a reliable solution to these challenges. In our tests, paints formulated with the additive clearly exhibited lower foaming during grinding and smaller viscosity changes during storage than paints prepared with the market alternatives. Due to its strong dispersion power, Dispersogen® PLF 100 also imparted excellent color strength.

The polymeric dispersing agent for waterborne pigment preparations is broadly applicable and can not only be used with organic pigments but also with selected inorganic ones and carbon blacks. Additional benefits include low microfoaming during paint application, reduced blocking and low leaching.

Another point to look out for when formulating pigment pastes: The resulting paints should comply with current regulations, trends and eco-label requirements.



PRODUCT PROFILE

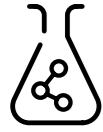
| | DISPERSOGEN® PLF 100 | Alternative 1 | Alternative 2 |
|---------------------|-------------------------|---------------|---------------|
| Low foaming | ● | ● | ● |
| Storage stability | ● | ● | ● |
| Color strength | ● | ● | ● |
| Organic pigments | ● | ● | ● |
| Inorganic pigments* | ● | ● | ● |
| Low leaching | ● | ● | ● |
| Reduced blocking | ● | ● | ● |

*excellent performance for selected global pigment grades

● excellent ● good ● satisfying



Functional groups for wetting and solubility – PLUS FUTURE-PROOF SUSTAINABILITY



PRODUCT PROFILE*

| | |
|-----------------------------------|------------------------------|
| Active substance content | approx. 100% |
| Appearance at 25 °C | yellowish, highly viscous |
| Density at 50 °C (DIN 15212-1) | about 1.08 g/cm ³ |
| Viscosity at 50 °C | 2000–2400 mPa·s |
| Pour point (ISO 3016) | approx. 6 °C |
| Solubility at 20 °C | soluble in water |
| pH value, 10m-% in water | 4.5–5.0 |

Product properties that facilitate formulation

Dispersogen® PLF 100 is a comb polymer with pigment-affine groups that promote pigment wetting. Other functional groups attached to the polymer enhance its solubility in water.

* The properties are for guidance only and do not represent product specifications. Tolerances can be found in the product specification sheet. For further information on product properties, toxicological, ecological and safety data, please refer to the safety data sheet.



REGULATORY INFORMATION

- **No structural units of concern**
- **APEO/NPEO-free**
- **Low VOC (< 0.1% DIN ISO 11890-2)**
- **Free of organic solvents**
- **Biocide-free***

Regulations are getting stricter – and products must keep up

Some of the most commonly used dispersing agents on the market use bisphenol A, alkylphenol, or tristyril phenyl moieties to promote pigment affinity. Since these moieties can be released during biodegradation, however, their potential effects on aquatic organisms are under intense scrutiny.

By design, Dispersogen® PLF 100 is free of such moieties.

* No additional biocides are introduced into the pigment paste with the use of the dispersing agent: the dispersing agent is stable against elevated pH values.



SUSTAINABILITY PROFILE

Consumers want reassurance, eco-labels provide it

Dispersogen® PLF 100 complies with the criteria of these well-known and widely respected European eco-labels:

EUROPEAN ECOFLOWER

GERMAN BLUE ANGEL

SCANDINAVIAN NORDIC SWAN



ECOTAIN®

Dispersogen® PLF 100 is certified with the EcoTain® label which stands for best-in-class products exceeding market standards in all three sustainability dimensions: social, environmental and economic.



Additional benefits with TESTED RELIABILITY



BROAD APPLICABILITY

| | | DISPERSOGEN® PLF 100 | | ALTERNATIVE 1 | | ALTERNATIVE 2 | |
|--------------|--|----------------------|-------------------|----------------|-------------------|----------------|-------------------|
| | | Color strength | Storage stability | Color strength | Storage stability | Color strength | Storage stability |
| Organic | Hansa™ Brilliant Yellow 2GX70S Pigment Yellow 74 | ● | ● | ● | ● | ● | ● |
| | Novoperm® Yellow HR 03 Pigment Yellow 83 | ● | ● | ● | ● | ● | ● |
| | Permanent Red FGR Pigment Red 112 | ● | ● | ● | ● | ● | ● |
| | Hostaperm® Pink ED-W Pigment Red 122 | ● | ● | ● | ● | ● | ● |
| | Hostaperm® Blue B2G EDS Pigment Blue 15:3 | ● | ● | ● | ● | ● | ● |
| | Hostaperm® Violet RL 02 Pigment Violet 23 | ● | ● | ● | ● | ● | ● |
| | Hostaperm® Green GNX Pigment Green 7 | ● | ● | ● | ● | ● | ● |
| Inorganic* | Bayferrox™ 130 M Pigment Red 101 | ● | ● | ● | ● | ● | ● |
| | Bayferrox™ 110 M Pigment Red 101 | ● | ● | ● | ● | ● | ● |
| | Bayferrox™ 180 M Pigment Red 101 | ● | ● | ● | ● | ● | ● |
| | Heucodur Blue 551 Pigment Blue 28 | ● | ● | ● | ● | ● | ● |
| | Bayferrox™ 316 Pigment Black 11 | ● | ● | ● | ● | ● | ● |
| Carbon Black | Printex™ 300 (Orion Engineered Carbons) Pigment Black 7 | ● | ● | ● | ● | ● | ● |
| | Printex™ FW 171 Pigment Black 7 | ● | ● | ● | ● | ● | ● |
| | Printex™ V/U Pigment Black 7 | ● | ● | ● | ● | ● | ● |
| | Printex™ PX 85 Pigment Black 7 | ● | ● | ● | ● | ● | ● |

● excellent ● good ● satisfying

Dispersogen PLF 100 can be used over a range of different pigments. It provides exceptional overall storage stability that cannot be achieved with the common competitor products.
*excellent performance for selected global pigment grades



LOW FOAMING WHEN PAINT IS APPLIED

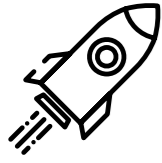
To test for behavior during paint application, we added Dispersogen® PLF 100 and two alternatives to a low PVC acrylic lacquer. Alternative 1 created copious microfoam, alternative 2 caused both micro- and macrofoaming. Our product, by contrast, created a surface that was smooth, tack-free (no blocking) and free of leaching.



BETTER HANDLING

| | |
|-------------------------|---|
| REDUCED BLOCKING | When applied in a finished paint, the new polymer exhibits reduced tack and good compatibility. |
| LOW LEACHING | Low leaching in exterior paints |
| HANDLING | Due to 100% active content of the dispersing agent, less water is introduced into the formulation. Flowable and pumpable at room temperature. |

Outstrips the alternatives in ENHANCING PERFORMANCE



PERFORMANCE-BOOSTING EFFECTS

Low foaming

Even when adding defoamers, formulators have to contend with a strong foaming tendency in pigments such as the naphthol pigment Red 112. With Dispersogen® PLF 100, the density of the formulation stays well above 1 g/mL, meaning no or little air has been introduced, while the alternatives fail to prevent significant foaming and expansion.



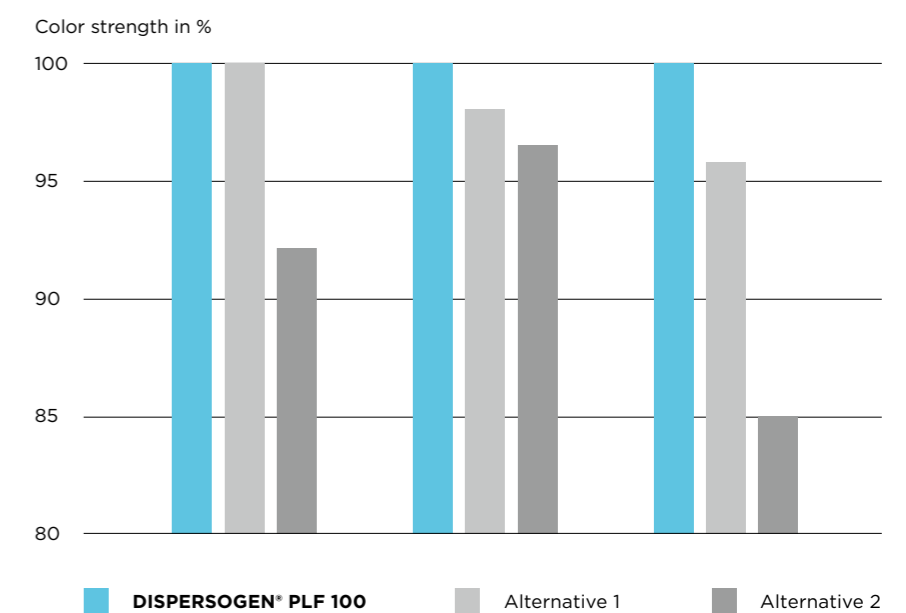
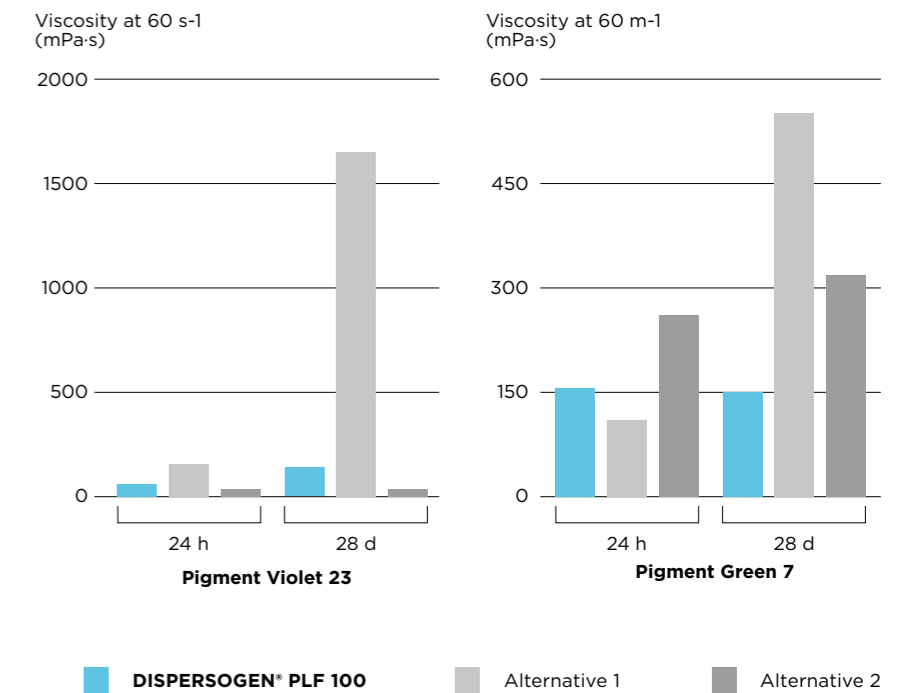
Storage stability

We simulated a 2-year storage with two particularly demanding pigments, Pigments Violet 23 and Green 7, by storing the pastes made with them for 28 days at 50 °C. Again, Dispersogen® PLF 100 delivered a superior overall performance, while also preserving the initial color strength of the pastes.



Color strength

In our tests, Dispersogen® PLF 100 dispersed pigments from all organic classes equally well, whether it was a simple monoazo pigment (PY 74), a common phthalocyanine pigment (PB 15:3), or a delicate dioxazine pigment (PV 23). While alternative 1 delivered similarly consistent performance in terms of color strength, it proved inferior in our tests for storage stability.



Guide formulation

DISPERSOGEN® PLF 100

| PIGMENT | ORGANIC PIGMENTS | | | | | | | INORGANIC PIGMENTS | | | | | CARBON BLACK PIGMENTS | | | | | | |
|--------------------|--------------------------------|------------------------|----------------------|----------------------|-----------------|---------------------|-------------------------|------------------------------|--------------------------|---------------------|-----------------|-----------------|-----------------------|---------------|----------------|--------------|--------------------|----------------|------------|
| | | | | | | | | | | | | | | | | | | | |
| Color index | PY 74 | PY 83 | PG7 | PG7 | PR 112 | PB 15:1 | PB 15:3 | PV 23 | PV 23 | PR 122 | PR 101 | PR 101 | PR 101 | PB 28 | PBk 11 | PBk 7 | PBk 7 | PBk 7 | PBk 7 |
| Pigment trade name | Hansa™ Brilliant Yellow 2GX70S | Novoperm® Yellow HR 03 | Hostaperm® Green GNX | Hostaperm® Green GNX | Pigment Red FGR | Hostaperm® Blue A4R | Hostaperm® Blue B2G-EDS | Hostaperm® Violet RL Spezial | Multifast Violet RL-2 CN | Hostaperm® Pink E02 | Bayferrox™ 110M | Bayferrox™ 130M | Bayferrox™ 180M | Heucodur™ 551 | Bayferrox™ 316 | Printex™ 300 | Color Black FW 171 | Printex™ PX 85 | Printex™ V |
| Pigment supplier | Clariant | Clariant | Clariant | Clariant | Clariant | Clariant | Clariant | Clariant | Clariant | Clariant | Lanxess | Lanxess | Lanxess | Heubach | Lanxess | Orion | Orion | Orion | Orion |

FORMULATION

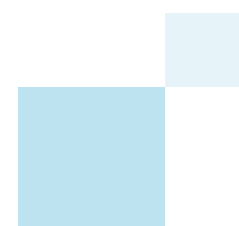
| | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|-------------|--|
| Pigment | 50.0% | 35.0% | 45.0% | 40.0% | 45.0% | 35.0% | 45.0% | 30.0% | 35.0% | 30.0% | 60.0% | 65.0% | 65.0% | 55.0% | 60.0% | 40.0% | 10.0% | 25.0% | 30.0% | |
| Dispersogen® PLF 100 | 4.0% | 7.0% | 8.0% | 6.0% | 4.0% | 8.0% | 6.0% | 7.0% | 6.0% | 7.0% | 4.0% | 4.0% | 4.0% | 4.0% | 4.0% | 8.0% | 10.0% | 10.0% | 6.0% | |
| Polyglykol G 300 | | | | 10.0% | | | | | 10.0% | | | | | | | | | | | |
| Polyglykol G 500 | 10.0% | 10.0% | 10.0% | | 10.0% | 10.0% | 10.0% | 10.0% | | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | 10.0% | |
| Emulsogen® LCN 407 | | | | 2.0% | | | | | 2.0% | | | | | | | | | | | |
| Oleic acid | | | | | | | | | | | 1.0% | 1.0% | | | | | | | | |
| Defoamer | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | |
| Biocide | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | 0.2% | |
| Water | 35.5% | 47.5% | 36.5% | 41.5 % | 40.5% | 46.5% | 38.5% | 52.5% | 36.5 % | 52.5% | 19.5% | 19.5% | 19.5% | 30.5% | 25.5% | 51.5% | 69.5% | 54.5% | 53.5% | |
| Total | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | |

VISCOSITY PROFILE

| | | | | | | | | | | | | | | | | | | | |
|--|-----|----|-----|-----|-----|----|-----|----|-----|----|------|-----|-----|-----|-----|-----|----|----|-----|
| Cone-Plate viscometer ¹ [mPa·s] | 160 | 86 | 145 | 458 | 416 | 68 | 181 | 92 | 218 | 71 | 1939 | 475 | 748 | 341 | 582 | 372 | 11 | 44 | 160 |
|--|-----|----|-----|-----|-----|----|-----|----|-----|----|------|-----|-----|-----|-----|-----|----|----|-----|

STORAGE STABILITY AND TINTING STRENGTH

| | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Storage stability | | | | | | | | | | | | | | | | | | | | |
| Tinting strength in high PVC ² emulsion paint | | | | | | | | | | | | | | | | | | | | |
| Tinting strength in low PVC ² acrylic laquer | | | | | | | | | | | | | | | | | | | | |
| Tinting strength in low PVC ² laquer | | | | | | | | | | | | | | | | | | | | |
| Compatibility in 2K PU system | | | | | | | | | | | | | | | | | | | | |
| Compatibility in water-borne/acrylate system | | | | | | | | | | | | | | | | | | | | |
| Compatibility in water-borne alkyd system | | | | | | | | | | | | | | | | | | | | |



CRITERIA FOR PERFORMANCE EVALUATION

RATING

| | |
|--|-------------------------|
| | Outstanding performance |
| | Very good performance |
| | Good performance |
| | Fair performance |

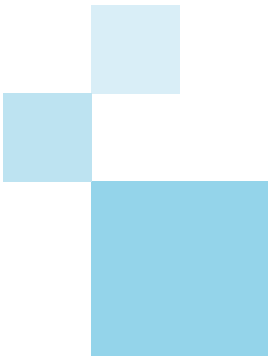
STORAGE STABILITY

- Viscosity¹ remains unchanged during storage
- No sedimentation/syneresis
- Viscosity¹ increases about 100 to 200 mPa·s within 4 weeks storage
- No sedimentation/syneresis
- Viscosity¹ increases > 200 mPa·s within 4 weeks but is still free-flowing
- Viscosity¹ increases > 200 mPa·s within 2 weeks but is still free-flowing

TINTING STRENGTH³

- Highest tinting strength
- No rub out
- 10-19% less tinting strength
- No rub out
- 20-29% less tinting strength
- Max. slight rub out
- > 30% less tinting strength
- Max. slight rub out

¹ Cone-Plate rheometer shear rate 1/60s, 23 °C, after 7 days at 50 °C
² PVC: pigment volume concentration
³ Against tristyryl phenol ethoxylate dispersing agent



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