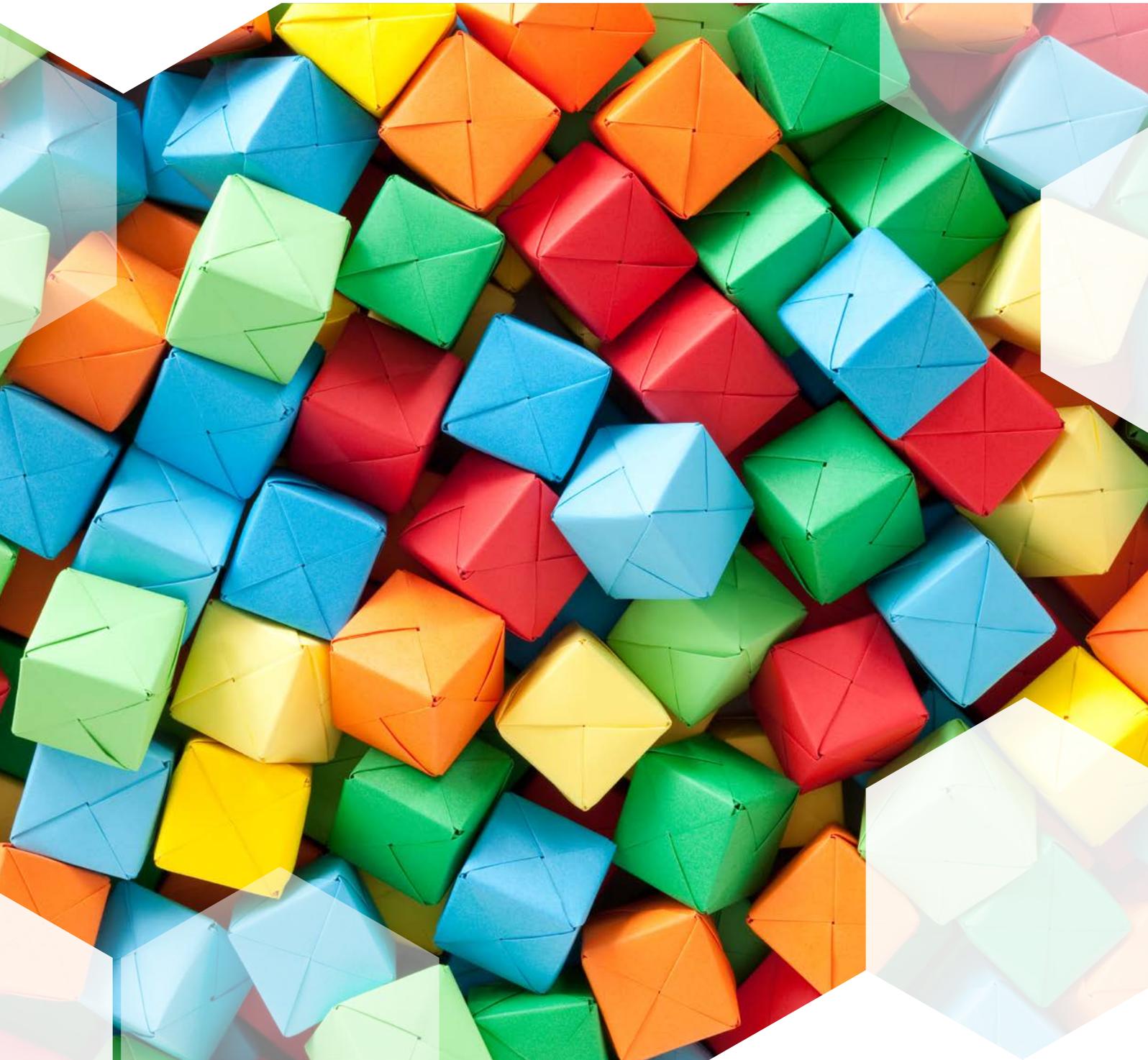
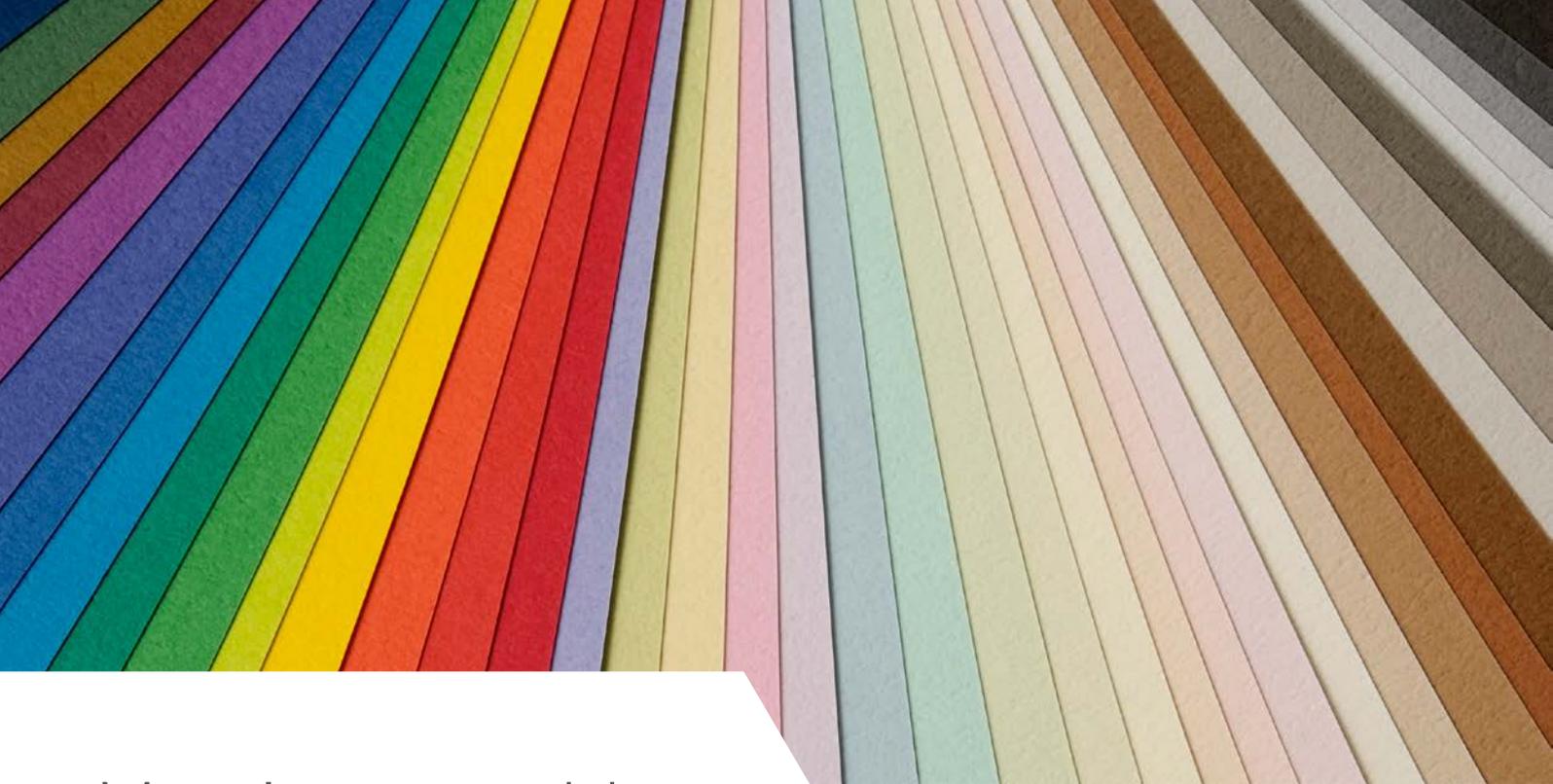


Paper Colorants

Dynamic colors, delivered reliably





Meeting a world of **new opportunities**

The world of modern paper manufacturing calls for high standards of paper grades and a wide range of special effects. From colors to handling properties, light fastness and customized board formulations, customers are becoming ever more demanding.

Helping you deliver the paper products your customers need

As the world leader in wet-end chemical innovation and production, Solenis offers you a comprehensive range of products that enhance the visual appearance and quality of any conceivable paper and board grade. Achieving the results you need, no matter what your customers ask of you.

The technical specialists

Our mission is to provide you with the best products available anywhere. With our extensive R&D and state-of-the-art production facilities, our technical expertise in this field is unparalleled. In addition, Solenis is committed to manufacturing excellence in terms of quality, efficiency, sustainability and supply-chain reliability.

The colorant range

This brochure will guide you through our specialist range of colorant products: Pergasol™, Pergabase™, Pergalite™ and Solar™. We have also included useful information about recommended applications and techniques for each product.

Our colorant products have been designed to provide a wide spectrum of colors that can be used to enhance an extensive variety of paper, tissue and board grades. Whatever your requirements, our colorants will ensure that you can achieve the exact shade and paper quality your customers are looking for.

One product family, many applications

Our three paper colorant brands are Pergasol™, Pergabase™, Solar™ (Americas) and Pergalite™ (Eurasia). These high-quality colorants have been specially formulated to meet the coloring needs of the paper manufacturing industry, far into the future. Each product has been optimized for specific applications

Solenis Pergasol™

Solenis Pergasol™ liquid and Pergasol™ powder direct dyes are ionic water soluble synthetic dyes (most of them are azo dyes). These contain several sulphonic or carboxyl groups to enable the solubility of the dye molecule.

This dye group is well known for its suitability for furnishes used in papermaking. This, coupled with their generally 'good' to 'very good' resistance to fading, bleeding and chemicals, makes Pergasol™ direct dyes suitable for the following dyeing applications:

- Printing and writing papers
- Hygiene papers
- Paper board
- Corrugated case materials
- Special papers

Solenis Solar™ and Pergalite™

Solenis Solar™ and Pergalite™ is the trade name for a range of specially manufactured organic pigments in an aqueous, anionic formulation. These pigments generally have 'good' to 'outstanding' resistance to fading, bleeding and chemicals, enabling them to be used for:

- High light fastness printing papers
- Decorative papers for laminate production
- Coloring coating compounds for printing and copying papers and board
- Shading white and fluorescent whitened papers
- Vegetable parchment grades
- Controlling colored two-sidedness in conjunction with direct dyes (Pergasol™)
- Laundry tag papers (certain Solar™ and Pergalite™ products)
- Tinting white papers for the highest brightness / whiteness

Solenis Pergabase™

The Solenis Pergabase™ basic dye range is intended for use in the tinting of newsprint and wood containing papers, Pergabase is used as well for coloration of waste-based packaging grades.

The Pergabase™ dye group is very economical and can be used for brilliant shades. Its light fastness properties are sufficient for the grades produced.



Pergasol™ liquid dyes and powder dyes

Application recommendations

Anionic dyes

These are especially suitable for dyeing wood-free papers or papers containing small amounts of lignin. In batchwise dyeing, anionic dyes should be added as early as possible, allowing sufficient time for uptake by the stock. Sizing and other process chemicals should preferably be added after the dyes.

Fixatives can normally be added at the end, if possible continuously and shortly before the headbox. Excessive amounts of aluminum sulphate, fixatives or other paper auxiliaries should be avoided.

Cationic dyes

Before adding these dyes, it is advisable to neutralize troublesome anionic trash with cationic fixatives or aluminum sulfate. Because of their positive charge and more rapid uptake, cationic dyes are highly suitable for continuous application.

To avoid mottling, care should be taken to ensure rapid, thorough mixing with the stock. Careful preliminary diluting reduces the tendency to mottling.

In continuous addition, the dye should be diluted with fresh water (constant pressure) shortly before addition. Agitation of the stock should be vigorous to ensure rapid, thorough mixing. When adding, it is advisable to place a strainer with a large surface in front of the dispensing equipment. The dispensing pump should be thoroughly rinsed each time the shade is changed. Old stock solutions can cause dispensing problems if not filtered and they should be checked before use.

Application techniques

Batchwise dyeing

To improve shade consistency, dyes should always be added to the stock in the same order (e. g. yellow, red, blue). Changes in the order of addition may cause shade variation. To achieve the best dyeing costs, uptake time should be as long as possible and the dyes thoroughly mixed with the stock. Cationic products (aluminum sulfate, fixatives, etc.) are best added as late as possible.

Continuous dyeing

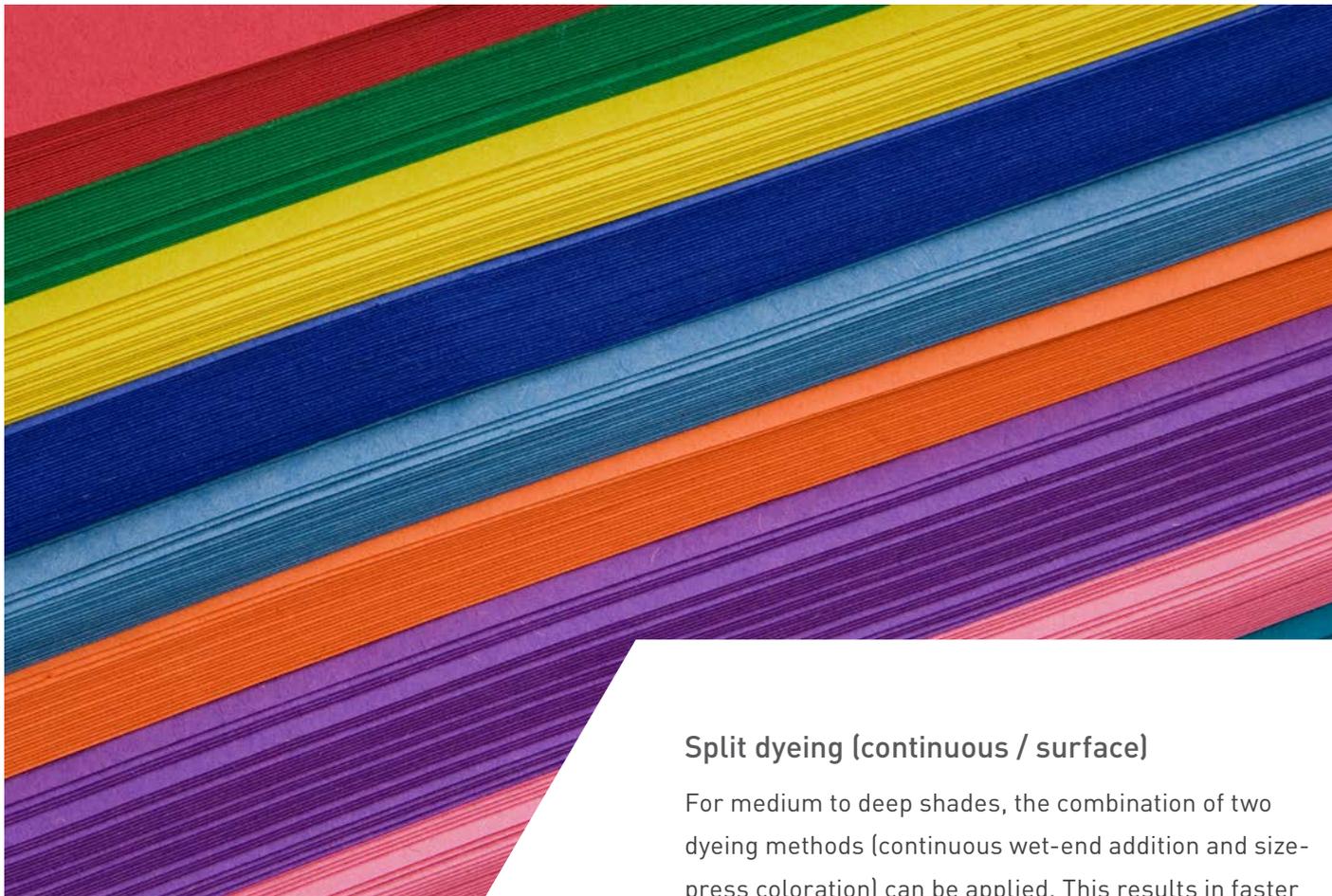
Pale and medium shades are mainly dyed continuously. The dyes should be dispensed as early as possible in the level (or stuff) box or mixing pump. It is essential that no dyed stock passes back into the machine chest. Only dyes with good affinity should be used for continuous dyeing. When using anionic and cationic dyes in the same recipe, we usually recommend adding the anionic dye first. These dyes must always be dispensed at different times and points.

Split dyeing (batch / continuous)

If applying 100 % color at the wet-end, it is often advantageous for medium and deep shades to add up to 70 % of the color into the pulper or mixing chest, with the remainder added continuously via metering pumps after the stuff box or before the fan pump. This approach offers the following benefits:

- Quick shade changes and corrections
- Ability to achieve deep shades
- Long contact time
- Dyes with lower affinity can be used
- Less fixing agent necessary
- Less "off shade" production throughout a run





Split dyeing (continuous / surface)

For medium to deep shades, the combination of two dyeing methods (continuous wet-end addition and size-press coloration) can be applied. This results in faster shade adjustments, maintains flexibility in shade control and achieves brighter shades.

It is quite possible that up to 80% of the color can be added to the size-press, with the remainder being added continuously prior to the headbox for shade control. This approach offers the following benefits:

- Correction of color two-sidedness
- Improved sheet appearance
- Reduction of “white” edging effect

Split dyeing techniques call for careful consideration to be given to any impact on bleed fastness and sheet appearance.

Please note:

With all surface coloration applications, you are strongly recommended to carry out compatibility checks with the carrier chemical (e. g. starch) prior to any machine trials.

Surface coloration

Various paper grades can use and are using direct dyes on the surface. This can be done in the size-press (most common), calendar stack, in a dip dye batch or during printing applications.

Surface coloration at the size-press is not widespread. However, this approach can be used to achieve special effects or cost reductions in deep shades, or for correcting color two-sidedness. Adding color to the surface of paper results in the following benefits:

- Cost reduction due to lower dyeing costs, particularly on heavier weight grades
- Increased productivity due to quicker shade changes and an almost white (except broke) wet-end system
- Reduced ecological impact due to cleaner backwaters and cleaner waste water systems

When using surface coloration, careful consideration should be given to the impact on bleed fastness and sheet appearance.

Solar™ and Pergalite™ – pigment dispersions

Application recommendations

Solar™ for tinting

The tint of White paper is very sensitive to the human eyes. Getting the Solar™ tinting application right improves the cost of paper production. To have control of the final white paper appearance, at least two colorants are needed, most common a blue, violet or red.

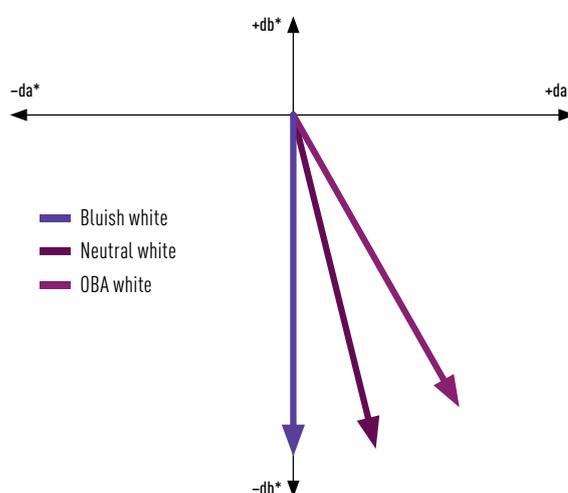
Solar™ for coloration

Solar™ products offer a full range of pigment colorants to meet the needs of high-quality colored paper. Solar™ can be used alone or together with Pergasol™ direct dyes in wet-end or in size press to enhance appearance or to lower the cost of production. End user demands, like light fastness and food contact properties are important when making the right selection when tinting with pigment preparations.

Pergalite™ blends for tinting

Pergalite™ are also available as ready-made blends providing the desired tinting effect with only one product. The blends cover the hue angles from $-db^*$ axis (bluish white) to the shade of OBA white.

- **Brilliant tint:** Very low absorption of blue light provides the most brilliant possible tint and lowest cost for production of paper with high brightness
- **Light fast:** Some paper grades need to have good resistance against light induced ageing
- **FDA compliant:** Specifically tested for food contact and compliant with FDA § 176.170 and § 176.180



Solar™ and Pergalite™ for Medium and Deep Shades

Solar and Pergalite pigment dispersions are often used in Medium and Deep colored paper grades where light fastness and chemical resistance are needed.

All Solar and Pergalite pigment dispersions have excellent stability, shelf life and are mixable with most furnish types, size press and coating formulas.



Pergabase™ – basic dyes

Application recommendations

Basic dyes

The Pergabase™ basic dye range is intended for use in the tinting of newsprint / wood containing papers, or the coloring of waste-based packaging grades. This dye group is very economical and can be used for tinting, medium and deep brilliant shades. The light fastness properties are sufficient for these paper grades.

Application techniques

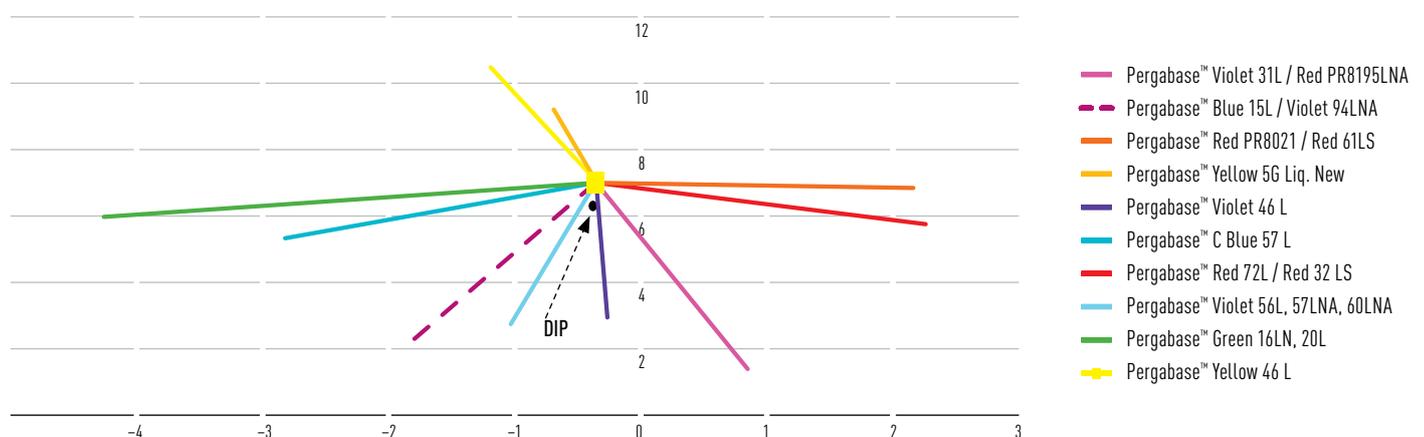
Batchwise dyeing

To improve shade consistency, dyes should always be added to the stock in the same order (e. g. yellow, red, blue). Changes in the order of addition may cause shade variation.

Continuous dyeing

Tinting and pale shades are mainly dyed continuously. The dyes should be dispensed as early as possible in the level (or stuff) box, mixing or fan pump.

Tinting effect of various Basazol™ dyes



For deeper shades Tamol™ NOP (powder) or Tamol™ NNP (liquid) can be used. It is recommended to add 30 % of Tamol™ NOP (calculation is based on dyestuff level). Tamol NNP is the diluted version of Tamol™ NOP and needs twice the amount. Tamol™ works only, if alum or a retention aid is used.



Advanced problem-solving for your toughest challenges.

Solenis is a global leader in specialty chemicals for water-intensive industries. With an average of 20 years expertise, our team is the industry's most knowledgeable. That's how we solve your toughest challenges—whether you're in the pulp, paper, oil and gas, petroleum refining, chemical processing, mining, biorefining, power and municipal market. Combining the right people, the right experience and the right technology, we're built to deliver value.



 **SOLENIS**[™]
Strong bonds. Trusted solutions.

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