Products for NON IMPACT PRINTING

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Electrophotography and ink jet are the two most successful technologies in modern Non Impact Printing (NIP).

This brochure named »Products for Non Impact Printing« is mainly related to toner and ink jet products. Our range of innovative toner products are Charge Control Agents (CCAs), Pigments and Waxes for Electrophotographic Toners.

Our toner-specific products are branded under Copy (CCAs), Hostacopy® (pigment preparations), Licowax® (waxes) and Toner (pigments).

For ink jet we offer dyes, pigments and pigment preparations branded as Duasyn®, Duasynjet, Savinyl®, Ink Jet and Hostajet®.

Clariant has decades of experience in the development and manufacture of pigments and dyes. This experience includes R&D and production as well as worldwide technical service and supply. Over the past fifteen years Clariant has introduced innovative products for the toner and ink jet markets.

Each toner and ink jet product is described by an individual data sheet. New product developments are announced through News Bulletins and the Internet. Frequent scientific publications and presentations (Internet) provide the academic understanding of the most recent innovations.

For more general information on Clariant and its products, please contact your nearest Clariant representative or Clariant location listed under »Contacts.«

In addition Clariant offers Wacker's pyrogenic silicas HDK® for toner applications in Japan, Korea, US and Canada.

WWW.WACKER.COM/HDK

For more information visit our websites at

WWW.CLARIANT.COM
SALES RANGE

Charge Control Agents
Negative Charge Control Agents (CCAs), responsible for polarity and magnitude of the electrostatic toner charge (Copy).

Pigments
Specially developed range of toner pigments with specified triboelectric properties (Toner). Additional recommended pigments for toner applications (Permanent, Graphtol®, Hansa®, Novoperm®, PV Fast®, Hostaperm®).
PIGMENT PREPARATIONS
Non-dusting, easy-to-disperse concentrates available as standard or tailor-made products (Hostacopy®[1]). Liquid dispersions are available on request.

WAXES
Recommended waxes as release and dispersing additives for toner applications (Licocene®, Licowax®, Ceridust®).

NEW DEVELOPMENTS will be announced in News Bulletins.
Charge Control Agents

PRODUCT DESCRIPTIONS AND PROPERTIES

CLARIANT SELLS CHARGE CONTROL AGENTS (CCAs) FOR TONER APPLICATIONS UNDER THE BRAND NAME COPY.

Clariant’s Charge Control Agents (CCAs) are characterized by high efficiency, quick charge-up and long-term charge stability. In addition, their charging effects are not influenced by a change in environmental conditions such as humidity, temperature, etc. They also exhibit good thermal stability and are easy to disperse.

The colorless CCAs are designed for multi-purpose applications, i.e., for color toners as well as for black toners. All CCAs are compatible with common toner resins like styrene-acrylic, polyester, epoxy, etc.

ADVANTAGES
- Good dispersibility
- Quick charge-up
- Adjusted tribo level
- Long term chargeability
- Multi-purpose CCAs for colored and black toner

THERMAL STABILITY checked by
Differential Scanning Calorimetry (DSC)
Charge Control Agents

PRODUCT RANGE

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>POLARITY</th>
<th>COLOR</th>
<th>CHEMICAL CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COPY CHARGE N4P</td>
<td>Negative</td>
<td>Colorless</td>
<td>Modified inorganic polymeric compound</td>
</tr>
<tr>
<td>COPY CHARGE N5P-01</td>
<td>Negative</td>
<td>Colorless</td>
<td>Modified inorganic polymeric compound</td>
</tr>
</tbody>
</table>

SEM (Scanning Electron Microscopy) image

10000 x 1 µm Copy Charge N4P

500 x 10 µm Copy Charge N5P-01 VP 2931
Pigments

PRODUCT DESCRIPTIONS AND PROPERTIES

CLARIANT SELLS ORGANIC PIGMENTS FOR TONER APPLICATIONS UNDER THE BRAND NAME TONER.

Pigments must satisfy coloristic requirements such as hue, tinctorial strength, and transparency; also, they must possess good heat resistance and light fastness. In addition, pigments should meet triboelectric requirements. Chemically identical pigments can show very different properties depending on their chemical processes.

Clariant recommends specific pigment grades that are fundamental for quality color toners. Toner pigments are characterized with respect to their triboelectric properties and offer special advantages to toner manufacturers.

TRIBOELECTRIC SPECTRUM OF PIGMENT CLASSES

[µC/g]

EACH PIGMENT CLASS as its typical range within the triboelectric spectrum and influences polarity and magnitude of the toner charge.
Clariant has developed a special range of toner pigments. These products offer additional advantages to the toner industry, e.g. good dispersibility and compatibility in toner resins, and high transparency. In addition, the triboelectric properties are specified and monitored.

The pigments listed for the process colors of yellow, magenta, and cyan are a general recommendation. Special combinations may be necessary, depending on the particular toner resin and intended use (color copying, color printing, color proofing, etc.). Colour Index (C.I.) name and general pigment class are also given.

**ADVANTAGES**

- Good dispersibility
- Compatibility in toner resins
- High transparency
- Specified and monitored triboelectric properties
Pigments

PRODUCT RANGE

- Toner pigments (toner grades for process colors)
- Additional recommended pigments for toner applications
  (for shading, spot colors, etc.)

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>COLOR</th>
<th>COLOUR INDEX</th>
<th>CHEMICAL CLASS</th>
<th>LIGHT FASTNESS (1/2 SD)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TONER YELLOW 5GXT</td>
<td>Yellow</td>
<td>P.Y. 74</td>
<td>Monoazo</td>
<td>5</td>
</tr>
<tr>
<td>TONER YELLOW 4G</td>
<td>Yellow</td>
<td>P.Y. 155</td>
<td>Bisacetoacetylide</td>
<td>7–8</td>
</tr>
<tr>
<td>TONER YELLOW 3GP</td>
<td>Yellow</td>
<td>P.Y. 155</td>
<td>Bisacetoacetylide</td>
<td>7–8</td>
</tr>
<tr>
<td>TONER YELLOW 3GP-CT VP5152 - NEW</td>
<td>Yellow</td>
<td>P.Y. 155</td>
<td>Bisacetoacetylide</td>
<td>7–8</td>
</tr>
<tr>
<td>TONER YELLOW HG</td>
<td>Yellow</td>
<td>P.Y. 180</td>
<td>Benzimidazolone</td>
<td>6–7d</td>
</tr>
<tr>
<td>TONER MAGENTA E 02</td>
<td>Magenta</td>
<td>P.R. 122</td>
<td>Quinacridone</td>
<td>7</td>
</tr>
<tr>
<td>TONER MAGENTA E</td>
<td>Magenta</td>
<td>P.R. 122</td>
<td>Quinacridone</td>
<td>7–8</td>
</tr>
</tbody>
</table>

* The light fastness was determined in a draw down in a typical polyester toner resin.
**ADDITIONAL RECOMMENDED PIGMENTS** for toner applications

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>COLOR</th>
<th>COLOUR INDEX</th>
<th>CHEMICAL CLASS</th>
<th>LIGHT FASTNESS (<em>/1 SD)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>HANSA YELLOW SGX 01</td>
<td>Yellow</td>
<td>P. Y. 74</td>
<td>Monoazo</td>
<td>6</td>
</tr>
<tr>
<td>GRAPHTOL YELLOW GG</td>
<td>Yellow</td>
<td>P. Y. 17</td>
<td>Diarylide</td>
<td>4</td>
</tr>
<tr>
<td>PV FAST YELLOW HG 01</td>
<td>Yellow</td>
<td>P. Y. 180</td>
<td>Benimidazolone</td>
<td>7</td>
</tr>
<tr>
<td>NOVOPERM YELLOW FGL</td>
<td>Yellow</td>
<td>P. Y. 97</td>
<td>Monoazo</td>
<td>7d</td>
</tr>
<tr>
<td>GRAPHTOL YELLOW H2R</td>
<td>Yellow</td>
<td>P. Y. 139</td>
<td>Isoindoline</td>
<td>8</td>
</tr>
<tr>
<td>PERMANENT ORANGE RL 01</td>
<td>Orange</td>
<td>P. O. 34</td>
<td>Disazopyrazolone</td>
<td>4</td>
</tr>
<tr>
<td>PERMANENT CARMINE FBB 02</td>
<td>Blue-shade red</td>
<td>P. R. 146</td>
<td>Monoazo</td>
<td>6</td>
</tr>
<tr>
<td>INK JET MAGENTA E5B 02</td>
<td>Magenta</td>
<td>P. V. 19</td>
<td>Quinacridones</td>
<td>7d</td>
</tr>
<tr>
<td>PERMANENT RUBINE F6B</td>
<td>Blue-shade red</td>
<td>P. R. 184</td>
<td>Monoazo</td>
<td>5</td>
</tr>
<tr>
<td>HOSTAPERM BLUE B2G</td>
<td>Cyan</td>
<td>P. B. 15:3</td>
<td>Phthalocyanine</td>
<td>8</td>
</tr>
<tr>
<td>PV FAST BLUE BG</td>
<td>Cyan</td>
<td>P. B. 15:3</td>
<td>Phthalocyanine</td>
<td>8</td>
</tr>
<tr>
<td>PV FAST GREEN GNX</td>
<td>Green</td>
<td>P. G. 7</td>
<td>Phthalocyanine</td>
<td>8</td>
</tr>
</tbody>
</table>

* = Please note that these products were standardized in different applications like paints, etc.

** = The light fastness was determined in a draw down in a typical polyester toner resin.

Further pigments for toner application can be recommended upon request

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**HIGH VOLUME**, high quality blend of pigments
Pigment preparations

PRODUCT DESCRIPTIONS AND PROPERTIES

CLARIANT SELLS PIGMENT PREPARATIONS FOR TONER APPLICATIONS UNDER THE TRADEMARK HOSTACOPY.

A factor of utmost importance for the efficiency of pigments is their optimum degree of dispersion. Therefore, a pigment must be homogeneously incorporated into a toner resin by a physical process with high shear forces.

They are available as
· Standard pigment preparations
· Tailor-made pigment preparations (solid/liquid)

Therefore, pigment preparations enable a stable and optimal dispersion quality due to their special manufacturing process. Consequently, many manufacturers generally prefer pigment preparations instead of the pure powders for their toner formulations.

In addition liquid dispersions are available on request.

ADVANTAGES
· Non-dusting microgranules
· Excellent dispersion quality due to improved processing
· Easier dosing and blend mixing safe toner process costs
· Compatibility with common polyester toner resins

PIGMENT PREPARATION
by kneading
## Pigment preparations

### PRODUCT RANGE

### Pigment Preparations for Toners

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Color</th>
<th>Colour Index</th>
<th>Pigment</th>
<th>Pigment Content [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOSTACOPY HG-Y 101</td>
<td>Yellow</td>
<td>P.Y. 180</td>
<td>Toner Yellow HG</td>
<td>40</td>
</tr>
<tr>
<td>HOSTACOPY FBB 02-M 101</td>
<td>Magenta</td>
<td>P.R. 146</td>
<td>Permanent Carmine FBB 02</td>
<td>40</td>
</tr>
<tr>
<td>HOSTACOPY E 02-M 101</td>
<td>Magenta</td>
<td>P.R. 122</td>
<td>Toner Magenta E 02</td>
<td>40</td>
</tr>
<tr>
<td>HOSTACOPY BG-C 101</td>
<td>Cyan</td>
<td>P.B. 15:3</td>
<td>PV Fast Blue BG</td>
<td>40</td>
</tr>
</tbody>
</table>

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**Milling**
- by air jet

**Pigment Preparation**
- by pearl mill
Waxes

PRODUCT DESCRIPTIONS AND PROPERTIES

CLARIANT SELLS WAXES FOR TONER APPLICATIONS UNDER THE TRADEMARK LICOCENE, LICOWAX AND CERIDUST.

Clariant’s waxes for toner are not only additives which perform as release agents in modern toners, but they are also designed as special products for easier dispersion of CCAs and pigments in the toner resin.

Clariant offers a wide range of waxes. Detailed information can be found in our separate brochure named »Licowax®, Ceridust®, Licolub®, Licomont®« (DA 8048 E).

ADVANTAGES

- Effective dispersion of pigments and CCAs
- Low influence on optical properties of the toner resin-pigment system
- Excellent release properties during fixing; fuser oil-free printing
- Some Clariant waxes are dispersible in aqueous systems
- Suitability for chemically-prepared toners
Waxes
PRODUCT RANGE

WAXES FOR TONERS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>COLOR</th>
<th>MELTING TEMPERATURE (°C)</th>
<th>MELT VISCOSITY (mPa·s/°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LICOWAX E</td>
<td>Yellowish</td>
<td>~ 81</td>
<td>~ 30/100</td>
</tr>
<tr>
<td>CERIDUST 2051</td>
<td>White</td>
<td>~ 107</td>
<td>&lt; 20/140</td>
</tr>
<tr>
<td>LICOWAX PE 130</td>
<td>White</td>
<td>~ 130</td>
<td>~ 300/140</td>
</tr>
<tr>
<td>LICOWAX C</td>
<td>White</td>
<td>~ 142</td>
<td>&lt; 50/160</td>
</tr>
<tr>
<td>LICOCENE PP 6102</td>
<td>White</td>
<td>~ 145</td>
<td>~ 60/170</td>
</tr>
</tbody>
</table>

WAX RECOMMENDATION for target melting points

Clariant’s waxes for toner are suitable for styrene-acrylate toners and for polyester-based systems. For the classical range of toners based on styrene-acrylate, the polyethylene Licowax PE 130, Ceridust 2051 and the polypropylene Licocene PP 6102 are recommended.

Aqueous dispersions can be made using Licowax E which is very suitable for chemically-prepared toners (CPT: suspension, emulsion technologies).
Products for ink jet inks
SALES RANGE

COLORANTS FOR WATER BASED INK JET INKS

DYES:
Duasyn and Duasynjet grades are aqueous solutions of dyes specially designed for water based ink jet inks.

PIGMENT PREPARATIONS:
Aqueous pigment concentrates available as Hostajet PT.

COLORANTS FOR SOLVENT BASED INK JET INKS

DYES:
Powder grade dyes with very good solubility in alcohols, ketones and glycol esters (Savinyl).

PIGMENTS FOR WATER BASED, SOLVENT BASED AND UV CURING INK JET INKS

PIGMENTS:
Specially developed range of ink jet pigments. Additional pigments recommended for ink jet applications (Graphitol, Novoperm, PV Fast, Hostaperm).
Ink jet printing – HOW DOES IT WORK?

Within the Non Impact Printing technology, ink jet printing enjoys high popularity due to its flexibility to print monochrome and color on any surface.

Ink jet applications include monochromatic and color office printers and industrial printers for marking, addressing, coding and wide-format printing for posters.

There are two basic forms of ink jet systems: continuous and »drop-on-demand« (DOD). In continuous systems, ink emerges continuously from a nozzle at high pressure. Electrically charged ink droplets pass through deflection devices and are directed onto the substrate or deflected into an ink recovery unit. In DOD systems, droplets are generated by means of piezoelectric crystals or by heat dots (thermal jet).

For absorbent substrates like paper, aqueous based or water/alcohol based inks are preferred. For printing onto non-absorbent substrates such as glass, plastics and metals, inks based on low-boiling solvents (e.g., ethanol, MEK) in combination with a binder are applied.

**DROP-ON-DEMAND INK JET PRINTING**

**SPECIAL REQUIREMENTS OF COLORANTS FOR INK JET INKS**

- Good jetability
- High surface tension
- High light and water fastness
- Low viscosity
- Very good quality consistency
Colorants for water based ink jet inks

**DYES**

**DUASYN-SF/DUASYNJET-SF**

Duasyn/Duasynjet grades are mainly for desktop (office) use and are specially designed for water based ink jet inks.

The following properties are typical for all highly salt minimized Duasyn/Duasynjet SF grades used mainly for high performance ink jet ink systems:

- Low salt content
- High purity
- High surface tension
- High tinctorial strength and brilliancy

**SPECIAL INK JET GRADE SF DYSES**

<table>
<thead>
<tr>
<th>Product number</th>
<th>COLOUR INDEX</th>
<th>CHEMICAL CLASS</th>
<th>DYE CONTENT [approx. %]</th>
<th>LIGHT FASTNESS¹</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUASYN YELLOW 3GF-SF LIQ.</strong> 287598</td>
<td>D. Y. 132</td>
<td>Azo</td>
<td>8</td>
<td>4–5</td>
<td>High performing red shade yellow</td>
</tr>
<tr>
<td><strong>DUASYN ACID YELLOW XX-SF LIQ. - NEW 120115</strong></td>
<td>A. Y. 23</td>
<td>Azo</td>
<td>8</td>
<td>4–5</td>
<td>Standard red shade yellow</td>
</tr>
<tr>
<td><strong>DUASYN ACID YELLOW XX-SF² 213363</strong></td>
<td>A. Y. 23</td>
<td>Azo</td>
<td>100</td>
<td>4–5</td>
<td>Standard red shade yellow</td>
</tr>
<tr>
<td><strong>DUASYN BRILLIANT RED F3B-SF LIQ. 271731</strong></td>
<td>R. R. 180</td>
<td>Azo</td>
<td>15</td>
<td>4</td>
<td>Standard magenta, reactive dye</td>
</tr>
<tr>
<td><strong>DUASYN CYAN R-SF LIQ. VP 5160 - NEW 277483</strong></td>
<td>D. B. 199</td>
<td>Phthalocyanine</td>
<td>10</td>
<td>7</td>
<td>Reddish shade cyan</td>
</tr>
<tr>
<td><strong>DUASYNJET CYAN FRL-SF LIQ. 197434</strong></td>
<td>D. B. 199</td>
<td>Phthalocyanine</td>
<td>10</td>
<td>7</td>
<td>Standard green shade cyan</td>
</tr>
<tr>
<td><strong>DUASYN ACID BLUE AE-SF 30 LIQ. 243248</strong></td>
<td>A. B. 9</td>
<td>Triarylmethane</td>
<td>30</td>
<td>2–3</td>
<td>Standard blue for shading</td>
</tr>
<tr>
<td><strong>DUASYN BLACK HEF-SF LIQ. 201312</strong></td>
<td>D. Bl. 168</td>
<td>Azo</td>
<td>19</td>
<td>5</td>
<td>Standard black</td>
</tr>
</tbody>
</table>

¹ The fastness properties were tested according to DIN ISO 12040 with an aqueous based ink jet ink containing 4 % Duasyn black dye or 2.5 % Duasyn/Duasynjet color dye applied onto plain paper.

² Powder form
**DUASYN**

Additional Magenta dye for economic ink jet inks:

**ADVANTAGES**

- Semi-purified (low to medium salt content)
- High surface tension

<table>
<thead>
<tr>
<th>COMMERCIAL GRADE DYESTUFFS</th>
<th>COLOUR INDEX</th>
<th>CHEMICAL CLASS</th>
<th>DYE CONTENT [approx. %]</th>
<th>LIGHT FASTNESS</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUASYN MAGENTA CR LIQ.</td>
<td></td>
<td>Azo</td>
<td>15</td>
<td>4</td>
<td>Highly brilliant shade magenta reactive dye</td>
</tr>
</tbody>
</table>

243957

1 = The fastness properties were tested according to DIN ISO 12040 with an aqueous based ink jet ink containing 4% Duasyn black dye or 2.5% Duasyn/Duasynjet color dye applied onto plain paper.
Colorants for water based ink jet inks

**PIGMENT PREPARATIONS**

**HOSTAJET**
Hostajet PT grades are aqueous nano-dispersed pigment preparations based on polymeric dispersants and ink jet quality pigments. Hostajet PTs are developed for ink jet applications.

**HOSTAJET GRADES:**
- Are fully dispersed pigments
  - No additional dispersing equipment needed
- Allow manufacturing of state-of-the-art ink jet inks

**ADVANTAGES**
- High color strength
- High transparency and brilliancy
- Excellent light fastness (may be used for outdoor applications)
- Excellent water fastness
- Good compatibility with acrylic resins and with a wide range of solvents
- Very narrow particle size distribution
- Excellent jettability
- No sedimentation
- Very low viscosity
## Hostajet Pigment Preparations for Ink Jet Inks

<table>
<thead>
<tr>
<th>Product</th>
<th>Colour Index</th>
<th>Chemical Class</th>
<th>Pigment Content (approx. %)</th>
<th>Particle Size (typical $d_{50}$) [nm]</th>
<th>Light Fastness$^1$</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hostajet Yellow 4G-PT VP 2669</td>
<td>PV. 155</td>
<td>Bisacetoacetylide</td>
<td>20</td>
<td>100</td>
<td>6–7</td>
<td>High performance green shade yellow</td>
</tr>
<tr>
<td>Hostajet Red D3G-PT VP 5121</td>
<td>P.R. 254</td>
<td>DPP</td>
<td>20</td>
<td>170</td>
<td>6–7</td>
<td>Mid shade red</td>
</tr>
<tr>
<td>Hostajet Magenta ESB-PT VP 3565</td>
<td>PV. 19</td>
<td>Quinacridone</td>
<td>20</td>
<td>80</td>
<td>7–8</td>
<td>High performance red shade magenta</td>
</tr>
<tr>
<td>Hostajet Magenta E7B-PT VP 5122 – New</td>
<td>–</td>
<td>Quinacridone</td>
<td>20</td>
<td>50</td>
<td>6–7</td>
<td>Mid shade magenta</td>
</tr>
<tr>
<td>Hostajet Magenta E-PT</td>
<td>P.R. 122</td>
<td>Quinacridone</td>
<td>20</td>
<td>70</td>
<td>7–8</td>
<td>High performance magenta</td>
</tr>
<tr>
<td>Hostajet Cyan BG-PT</td>
<td>P.B. 15:3</td>
<td>Phthalocyanine</td>
<td>20</td>
<td>80</td>
<td>8</td>
<td>High performance standard cyan</td>
</tr>
<tr>
<td>Hostajet Green 8G-PT VP 5154</td>
<td>PG. 36</td>
<td>Phthalocyanine</td>
<td>20</td>
<td>45</td>
<td>7–8</td>
<td>Yellow shade green</td>
</tr>
<tr>
<td>Hostajet Black O-PT</td>
<td>P.Bl. 7</td>
<td>Carbon Black</td>
<td>15</td>
<td>70</td>
<td>8</td>
<td>High performance standard black</td>
</tr>
</tbody>
</table>

$^1$ The fastness properties were tested according to DIN ISO 12040 with an aqueous based ink jet ink containing 5% pigment applied onto plain paper.
Colorants for solvent based ink jet inks

**DYES**

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**ADVANTAGES**

- Very good solubility in alcohols, ketones and glycol esters.

**SAVINYL DYES FOR INK JET INKS**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>COLOUR INDEX</th>
<th>CHEMICAL CLASS</th>
<th>LIGHT FASTNESS</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAVINYL YELLOW RLS</td>
<td>S.Y. 83:1</td>
<td>Azo t:2 Cr-complex</td>
<td>7–8</td>
<td>Standard yellow with good solubility in ketones</td>
</tr>
<tr>
<td>103319</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAVINYL RED 3BLS</td>
<td>S.R. 91</td>
<td>Azo t:2 Co-complex</td>
<td>6</td>
<td>Magenta with good solubility in ketones</td>
</tr>
<tr>
<td>103337</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAVINYL PINK 6BLS</td>
<td>S.R. 127</td>
<td>Azo t:2 Cr-complex</td>
<td>4</td>
<td>Standard magenta with good solubility in appropriate ketones</td>
</tr>
<tr>
<td>103526</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAVINYL BLUE GLS</td>
<td>S.B. 44</td>
<td>Phthalocyanine</td>
<td>6</td>
<td>Standard cyan with good solubility in alcohols and ketones</td>
</tr>
<tr>
<td>103330</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAVINYL BLACK RLSN</td>
<td>S.Bl. 45</td>
<td>Azo t:2 Cr-complex</td>
<td>7</td>
<td>Standard black with good solubility in ketones</td>
</tr>
<tr>
<td>104213</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 = The fastness properties were tested according to DIN ISO 12040 on a print containing 5% Savinyl dye in vinyl copolymer, applied at 2–3g/m² on aluminum foil.

**DUASYN DYE FOR INK JET INKS**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>COLOUR INDEX</th>
<th>CHEMICAL CLASS</th>
<th>LIGHT FASTNESS</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUASYN BLACK A-RG</td>
<td>S. Bl. 27</td>
<td>Azo t:2 Cr-complex</td>
<td>7</td>
<td>Standard black with good solubility in MEK</td>
</tr>
<tr>
<td>108191</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 = The fastness properties were tested according to DIN ISO 12040 on a print containing 5% dye in vinyl copolymer, applied at 2–3g/m² on aluminum foil.
Pigments
FOR WATER BASED, SOLVENT BASED AND UV CURING INK JET INKS

Clariant offers a comprehensive range of high quality organic pigments for ink jet applications.

The range consists of:
· Selected High Performance Pigments
· Ink Jet Grade Pigments

Clariant recommends using Ink Jet grade pigments for the most technologically advanced inks. These recommendations are based on extensive tests performed by our ink jet experts.

SELECTED HIGH PERFORMANCE PIGMENTS

ADVANTAGES Selected based on their:
· Color properties
· Good light fastness
· Long-term ink stability performance

INK JET GRADE PIGMENTS

ADVANTAGES These specially designed pigments for ink jet applications exhibit on addition:
· Jettability behavior
· Flocculation stability of inks
· Flow properties/viscosity
### Pigments
**FOR WATER BASED, SOLVENT BASED AND UV CURING INK JET INKS**

#### SELECTED HIGH PERFORMANCE PIGMENTS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>PRODUCT NUMBER</th>
<th>COLOUR INDEX</th>
<th>CHEMICAL CLASS</th>
<th>MAIN APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yellow</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INK JET YELLOW H4G VP 3853</td>
<td>237721</td>
<td>PY. 151</td>
<td>Benzimidazolone</td>
<td>Water</td>
</tr>
<tr>
<td>INK JET YELLOW H2G</td>
<td>237708</td>
<td>PY. 120</td>
<td>Benzimidazolone</td>
<td>Solvent</td>
</tr>
<tr>
<td>INK JET YELLOW 4GC</td>
<td>238736</td>
<td>PY. 155</td>
<td>Bisacetoacetarylde</td>
<td>UV curing</td>
</tr>
<tr>
<td>INK JET YELLOW 4G</td>
<td>167652</td>
<td>PY. 155</td>
<td>Bisacetoacetarylde</td>
<td></td>
</tr>
<tr>
<td>INK JET YELLOW 4G 01 VP5110</td>
<td>262854</td>
<td>PY. 155</td>
<td>Bisacetoacetarylde</td>
<td></td>
</tr>
<tr>
<td>PV FAST YELLOW HR 02</td>
<td>107498</td>
<td>PY. 83</td>
<td>Diarylide</td>
<td></td>
</tr>
<tr>
<td>NOVOPERM YELLOW P-M3R</td>
<td>118380</td>
<td>PY. 139</td>
<td>Isoindoline</td>
<td></td>
</tr>
<tr>
<td><strong>Magenta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRAPHHTOL CARMINE HF4C</td>
<td>105527</td>
<td>P.R. 185</td>
<td>Benzimidazolone</td>
<td></td>
</tr>
<tr>
<td>NOVOPERM CARMINE HF3C</td>
<td>107438</td>
<td>P.R. 176</td>
<td>Benzimidazolone</td>
<td></td>
</tr>
<tr>
<td>INK JET MAGENTA E5B 02</td>
<td>206153</td>
<td>PV. 19</td>
<td>Quinacridone</td>
<td></td>
</tr>
<tr>
<td>INK JET MAGENTA E7B VP 3958</td>
<td>242759</td>
<td>–</td>
<td>Quinacridone</td>
<td></td>
</tr>
<tr>
<td>INK JET MAGENTA E 02</td>
<td>181410</td>
<td>P.R. 122</td>
<td>Quinacridone</td>
<td></td>
</tr>
<tr>
<td>PV FAST PINK E 01</td>
<td>104953</td>
<td>P.R. 122</td>
<td>Quinacridone</td>
<td></td>
</tr>
<tr>
<td><strong>Cyan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PV FAST BLUE BG</td>
<td>106313</td>
<td>P.B. 15:3</td>
<td>Phthalocyanine</td>
<td></td>
</tr>
<tr>
<td>HOSTAPERM BLUE BT 617 D</td>
<td>118349</td>
<td>P.B. 15:4</td>
<td>Phthalocyanine</td>
<td></td>
</tr>
<tr>
<td>INK JET CYAN BG 10</td>
<td>230147</td>
<td>P.B. 15:3</td>
<td>Phthalocyanine</td>
<td></td>
</tr>
</tbody>
</table>
## SELECTED MID-PERFORMANCE PIGMENTS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>PRODUCT NUMBER</th>
<th>COLOUR INDEX</th>
<th>CHEMICAL CLASS</th>
<th>MAIN APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yellow</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TONER YELLOW HG</td>
<td>107587</td>
<td>PY. 180</td>
<td>Benzinimidazolone</td>
<td>■</td>
</tr>
<tr>
<td>PV FAST YELLOW HG 01</td>
<td>183981</td>
<td>PY. 180</td>
<td>Benzinimidazolone</td>
<td>■</td>
</tr>
<tr>
<td>TONER YELLOW 5GX T</td>
<td>238642</td>
<td>PY. 74</td>
<td>Monoazo</td>
<td>■</td>
</tr>
<tr>
<td>HANSA BRILLIANT YELLOW 5GX 03</td>
<td>107250</td>
<td>PY. 74</td>
<td>Monoazo</td>
<td>■</td>
</tr>
<tr>
<td>INK JET YELLOW 5GX-W VP 5163 – NEW</td>
<td>272576</td>
<td>PY. 74</td>
<td>Monoazo</td>
<td>■</td>
</tr>
<tr>
<td><strong>Magenta</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERMANENT CARMINE FBB 02</td>
<td>171294</td>
<td>P.R. 146</td>
<td>Monoazo</td>
<td>■</td>
</tr>
<tr>
<td>PERMANENT RUBINE P-L7B 01</td>
<td>241917</td>
<td>P.R. 57:1</td>
<td>BONA, Ca lake</td>
<td>■</td>
</tr>
<tr>
<td>PERMANENT RUBINE F6B 01</td>
<td>208822</td>
<td>P.R. 184</td>
<td>Monoazo</td>
<td>■</td>
</tr>
<tr>
<td>PERMANENT PINK F3B 01</td>
<td>213394</td>
<td>P.R. 147</td>
<td>Monoazo</td>
<td>■</td>
</tr>
</tbody>
</table>
Much effort is made to ensure a consistent quality of CCAs, dyes, pigments and pigment preparations.

For each CCA the charging efficiency is controlled by measuring the q/m-value (charge-to-mass ratio). The q/m-value quantifies the triboelectric properties of a toner ingredient dispersed in the toner matrix, both in sign and magnitude. In addition, relevant solid-state parameters are specified. For each pigment, properties such as shade, transparency and tintorial strength are controlled. For Toner Pigments the triboelectric properties are also specified.

For waxes, physical properties (melting temperature, melt viscosity) and chemical properties (acid numbers, saponification numbers) are controlled.

For each batch of water soluble salt-free (SF) dye, the salt content is specified, as well as the tintorial strength, shade, purity of shade, surface tension, conductivity, solubility, pH value and filterability.
For solvent soluble dyes, parameters like tinctorial strength, shade, purity of shade, solubility and filterability are specified.

For each pigment preparation, properties such as tinctorial strength, shade, purity of shade, transparency, viscosity and filterability are specified.

For pigments, tinctorial strength, shade, purity of shade and transparency are specified.

**PRODUCT INFORMATION**

Product Data Sheets (PDSs) and Material Safety Data Sheets (MSDSs) are available upon request.

**SAMPLING**

for measuring color properties by applying the paint evenly to a card
Packaging

STANDARD PACKAGING FOR THE NIP GRADES

Depending on the product form (liquid/powder) and product group, different packaging is available:

<table>
<thead>
<tr>
<th>COLORANTS AND ADDITIVES FOR ELECTROPHOTOGRAPHIC TONERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHARGE CONTROL AGENTS</strong></td>
</tr>
<tr>
<td>20 kg cardboard box (2 x 10 kg bags)</td>
</tr>
<tr>
<td><strong>PIGMENTS</strong></td>
</tr>
<tr>
<td>20 kg cardboard box (2 x 10 kg bags)</td>
</tr>
<tr>
<td><strong>PIGMENT PREPARATIONS</strong></td>
</tr>
<tr>
<td>20 kg cardboard box (2 x 10 kg bags)</td>
</tr>
<tr>
<td><strong>WAXES</strong></td>
</tr>
<tr>
<td>20 kg paper bags (2 x 10 kg bags)</td>
</tr>
<tr>
<td>25 kg paper bags</td>
</tr>
</tbody>
</table>

PACKAGING equipment
COLORANTS FOR WATER BASED INK JET INKS

DYES
For powders: 20 kg cardboard box (2 x 10 kg bags)
For liquids: 30 kg plastic drum, 200 kg plastic drum
1000 kg container, non-returnable

PIGMENT PREPARATIONS
30 kg plastic drum, 200 kg plastic drum

PIGMENTS FOR INK JET INKS
20 kg cardboard box (2 x 10 kg bags)

DYES FOR SOLVENT BASED INK JET INKS
20 kg cardboard box (2 x 10 kg bags)

Further information about packaging may be obtained upon request.
CHEMICAL CLASS
All products mentioned in this brochure are classified according to their chemical structure and application.

COLOUR INDEX
Colour Index provides all colorants (dyes and pigments) with two reference numbers on the basis of a) chemical classification and b) coloristic aspects, according to the widely accepted system of Colour Index Generic Names and Colour Index Constitution Numbers.

CONTINUOUS INK JET (CIJ)
In continuous systems, electrically charged ink droplets leave the nozzle at high pressure and pass continuously through deflection devices, and are directed onto the substrate or deflected into an ink recovery unit.

DROP ON DEMAND (DOD)
In DOD systems, droplets are generated by means of piezoelectric crystals or by heat dots (thermal jet).

DYE CONTENT
The dye content stated in approximate percentage is the concentration of dye in the aqueous or solvent based solution and should be regarded only as a guide. The decisive criterion when standardizing is the tinctorial strength.

DYES
Dyes are colorants chemically differentiated as Direct, Reactive, Solvent and Acid dyes, which are used for aqueous or solvent based ink jet inks.

GENERAL TEST CONDITIONS
The values quoted under Clariant test conditions. Any change in operating parameters, e.g., concentration in use, resin or substrate, can influence the test results.

INK JET SYSTEM
There are two basic forms of ink jet systems, continuous (CIJ) and drop-on-demand (DOD).

INK JET INKS
Ink jet inks can be generally divided into three main fields of application: water based inks, solvent based inks and UV curing inks.

LIGHT FASTNESS
The light fastness was determined with the Xenotest instrument from a drawdown in full shade in accordance with DIN ISO 12040 (eight-step Blue Wool scale). Rating 8 denotes outstanding light fastness and rating 1 very poor light fastness (d = darkening).

PIGMENT CONTENT
The pigment content stated in approximate percentage is the concentration of pigment in the preparation and should be regarded only as a guideline. The decisive criterion when standardizing is the tinctorial strength.

MEK
Methyl ethyl ketone, a volatile organic solvent used as the carrier for ink jet inks.

MELTING TEMPERATURE
Melting temperature of wax is described typically by measuring the drop point, i.e., the temperature when the molten wax drops by itself. The method is based on the standards DIN 51801/2 and ASTM D 127.

MELT VISCOSITY
Melt viscosity of wax is measured by using rotating viscosimetry devices. The melt viscosity of waxes depends on the temperature of the molten wax. Standard tests for melt viscosity of waxes are DIN 51562 and DIN 53018.
NIP
Non Impact Printing.

PARTICLE SIZE (AVERAGE SIZE OF PRIMARY PARTICLES)
The median value of the primary particle was determined as follows: a series of photos was taken with the transmission electron microscope and evaluated using a graphic tablet. After analysis of about 1000 primary particles, a particle size distribution was calculated in parts by volume. The $d_{50}$-value of this distribution is the median value.

PIGMENT DISPERSING
Distribution of a pigment, accompanied by a reduction of the agglomerate size to afford primary particles and aggregates. The objectives are deagglomeration, wetting, distribution and stabilization.

PIGMENTS
Pigments are insoluble colorants in the application medium. For certain applications, pigments are suitable for aqueous, solvent based as well as UV curing ink jet inks.

PREPARATIONS
Preparations are based on pigments dispersed in water (Hostajet) or in resins to provide ready-to-use colorants for aqueous or solvent based ink jet inks.

PPM
Parts per million (e.g., concentration of a component in a solution).

POLARITY
In electrophotographic printing the polarity of the toner could be either positive or negative. The sign of the polarity is controlled by Charge Control Agents. They also control magnitude, the charge-up behavior and long-term stability of the final toner charge characteristics.

SOLVENT BASED INKS
Solvent based inks contain colorants such as Savinyl dyes.

STANDARD DEPTH (SD)
An arbitrarily chosen depth of shade (color strength) for all hues, from which a uniform depth of shade may be determined for purposes of comparison. Depth of shade can then be described as a multiple or fraction of standard depth. The pigment content figure in percentage for the standard depth 1/1 SD and 1/3 SD was carried out according to DIN 53235.

VP
Trial product without fixed spezifikations.

WATER BASED INKS
Water based inks contain colorants such as Duasyn dyes and Hostajet aqueous ultra-fine pigment preparations.
The following list offers a selection of Clariant’s publications on Charge Control Agents (CCAs), Pigments and Waxes for Electrophotographic Toners as well as on Colorants for Ink Jet Inks:

1. **FUNCTIONALIZED INORGANIC POLYMER SALTS** AS CHARGE CONTROL AGENTS,
   Ulrike Rohr, Kristin Richter; Proceedings of International Conference on Society of Imaging Science and Technology; Pittsburgh, Sept. 7–12, 2008, pp. 26–29.

2. **HMLM: A NEW CHEMICAL CLASS FOR CHARGE CONTROL AGENTS,**

3. **THE SMALLER – THE BETTER?**
   INFLUENCE OF DISPERSION QUALITY ON THE PERFORMANCE OF TONER INGREDIENTS,

4. **COLORANTS FOR TONER APPLICATIONS:**
   STATUS AND TRENDS,

5. **CHARGE CONTROL AGENTS AND TRIBOELECTRICALLY-ADJUSTED PIGMENTS,**

6. **CHARGING EFFECTS OF ORGANIC PIGMENTS IN ELECTROPHOTOGRAPHIC TONERS,**
TONER AND INK JET

7 COLOR PIGMENTS DESIGNED FOR DIGITAL PRINTING,
H.-T. Macholdt, R. Baur, J. Geisenberger, H. Menzel,
W. Zöller; International Congress of Imaging Science (ICIS’02),
Tokyo, Japan, May 13-17, 2002; proceedings, pp. 517–518.

8 ELECTROPHOTOGRAPHIC TONERS AND INK JET INKS:
RAW MATERIAL REQUIREMENTS,

COLORANTS FOR INK JET INKS

9 FROM INK JET DYES TO INK JET PIGMENTS,
H.-T. Macholdt, 7th International Symposium on Functional

10 INK JET PIGMENTS: THE TRIPLE S CONCEPT,
H.-T. Macholdt, S. Schneider, C. Zeh, IS+T NIP 23 Conference,

11 DYNAMIC SURFACE TENSION: A MODERN METHOD
TO ENHANCE PERFORMANCE OF PIGMENTED INKS
FOR INK JET,
K.-H. Schweikart, B. Fechner, H.-T. Macholdt, Ink Maker,

12 BRILLIANT SPRAY: WIDE FORMAT INK JET PRINTING,

13 PIGMENTS FOR WIDE FORMAT INK JET APPLICATIONS –
TRENDS AND CHALLENGES,
Steffen Schneider; European Coatings Conference,

14 INK JET PRINTING: PERFORMANCE IMPROVEMENTS
THROUGH NANO-PIGMENT PREPARATIONS,
H.-T. Macholdt, K.-H. Schweikhart, H. Menzel, ICISH ‘04 in
Chinese Journal of Scientific Instruments, Vol. 25,
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Clariant’s Websites
FOR TONER
AND INK JET INKS

Information on the Clariant product range for toner and ink jet inks can be obtained via the internet.

Technical descriptions and examples of uses of Clariant pigments, waxes and charge control agents for toners and colorants for ink jet inks can be found under the following addresses:

WWW.CLARIANT.COM
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