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SIEGWERK

COLOR NEWS

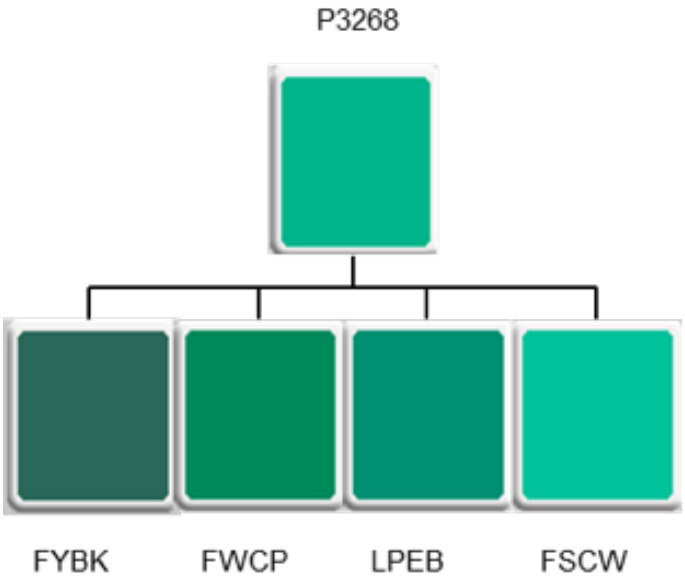
Business Unit Sheetfed

The PantoneLIVE Concept

PantoneLIVE is a cloud-based color system supplied by X-Rite, the owner of Pantone. PantoneLIVE houses digital Pantone master standards, dependent standards and brand owner colors.

Master Standard

The PantoneLIVE Master standards are taken from the official measurements for the Pantone+ Matching System. These colors have been printed in offset on a particular substrate; the intended use is, however, to define the view of a particular color design. PantoneLIVE Master standards only describe the view of the solid color shade and do not refer to a specific printing process, substrate or ink system.



Dependent Standards

Dependent standard colors are generated from Pantone colors (master standards) by varying print substrates, printing processes and technologies.

All dependent standards are stored in a centralized cloud, accessible to brand owners, designers, printers and converters.

Based on a wide range of applications and printing processes, **22 PantoneLIVE libraries** are now listed:

FSCC: Flexibles Flexo Solv Rev/Clr Film Lam Clr Film L
FSCT: Flexibles Flexo Solv Rev/Clr Film/Wht Ink
FSCW: Flexibles Flexo Solv Rev/Clr Film Lam Wht Film L
FSGB: Carton Flexo Solv Virgin Carton Board V
FSRC: Flexibles Flexo Solv Rev/Clr Film
FSWF: Flexibles Flexo Solv Wht Film
FUCV: Label Flexo UV Coated Paper V
FUWF: Label Flexo UV Wht Film
FVWF: Flexibles Flexo Solv (H) Wht Film
FWCP: Paper Packaging Flexo Water (M) Coated Paper
FYBK: Paper Packaging Flexo Water Brown Kraft
FYWK: Paper Packaging Flexo Water Wht Kraft
FYWT: Paper Packaging Flexo Water Wht Recycled Kraft
GVCC: Fexibles Gravure Solv Rev/Clr Film Lam Clr Film L
GVCW: Flexibles Gravure Solv Rev/Clr Film Lam Wht Film L
GVWF: Flexibles gravure Solv Wht Film
LPCV: Label Offset Coated Paper V
LPEB: Carton Offset Recycled Carton Board V
LPGB: Carton Offset Virgin Carton Board V
LUCV: Label Offset UV Coated Paper V
LUEB: Carton Offset UV Recycled Carton Board V
LUGB: Carton Offset UV Virgin Carton Board V

The traditional Pantone book is based on a single printing process and only two substrates. PantoneLIVE comprises 22 libraries according to the substrate families and printing processes. Color matching is more achievable because the target color is in line with the final application.

All generic PantoneLIVE libraries are available on the Public PantoneLIVE server, accessible from enabled software, provided the license has been acquired directly from X-Rite or from the ink manufacturer.

Regarding the specific colors, the brand owners administer themselves the access rights to their own colors through their dedicated portal.

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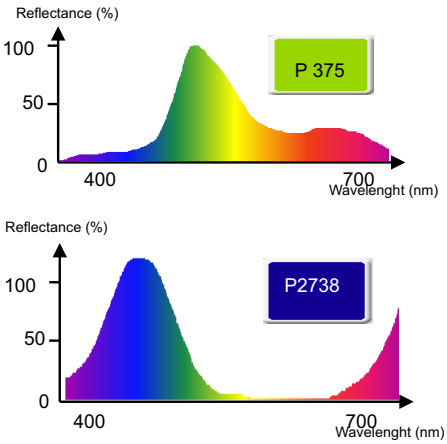
45/0° or Spherical Geometry?

Throughout the graphic chain, control and reproducibility of the color is the key of success. For this, a good color communication is essential between all actors: from the brand owner to the printer. The only universal language which is not influenced or disturbed by external factors is the spectral measurement. This scientific instrumentation is unavoidable. An important factor is the measuring geometry used. The measuring geometry used must be agreed between all parties involved and should correspond to the respective task. However, it isn't easy to choose among all the proposed equipment geometries on the market. Here is a short description that helps in the decision between 45/0° and the spherical geometry.



Incident Light: Tungsten Lamp
Receptors:
Spectral range: 400 – 700 mm
10 nm intervals = 31 measuring points

45/0° Geometry	Spherical Geometry (D8I)
• More in line with human eye perception • Advised for measuring on smooth and matt substrate. Suitable for standard paper, uncoated board.	• Takes into consideration the surface appearance (gloss, metallized aspect) • Advised for measuring on metallized substrates, for metallic inks and all applications on highly glossy surfaces.
Examples of equipment: eXact X-Rite FD7- Konica Minolta	***Examples of equipment:*** Ci6x series X-Rite CM 2600d / 2500d- Konica Minolta

Spectrophotometer Operating

Principle:
A light source is sent on the printed object. Reflected energy will be captured and analyzed.

Objective:
To quantify the light reflected according to the wavelength. Through the reflectance curve/ spectral curve, we know the characteristics of the color. Thanks to the spectral curve associated with the measurement conditions (illuminant and observer), we are able to calculate the L * a * b * C* h° values and so we can communicate color accurately.

Overprint varnishes

How they affect the color?
Whatever the printing process and chemistry, the overprint varnish (OPV) has many functions:

- upgrade print,
- improve the resistance to friction and mechanical stress,
- strengthen the resistance of the printed film to chemicals.

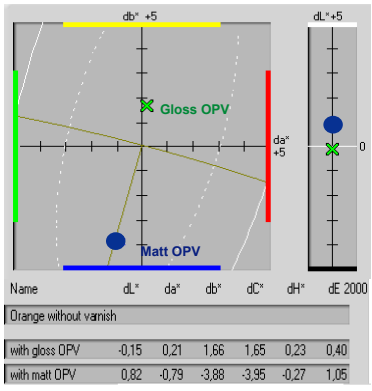
An OPV can affect the final color as shown in the illustration below.

With Matt OPV, the color becomes lighter and dirtier. Visually, color seems «milky» (whitish). This can be anticipated in the color development by increasing the pigment concentration in the formula.

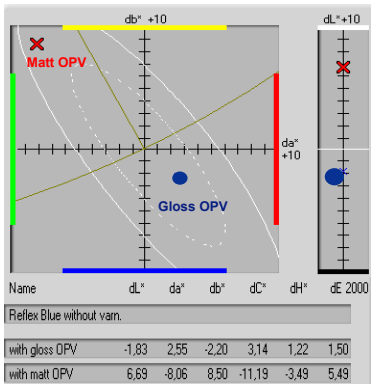
Gloss OPV removes the bronzing effect*. Hue deviation and ΔE can be significant when applying OPV especially on the strong & bronzing colors like Reflex Blue or Blackish-brown. Generally, colors become more saturated and intense.

***Bronzing effect:** Modification of the colored surface appearance mainly due to an uneven pigment wetting and the substrate porosity.

Orange



Reflex Blue **D50,2°, No filter**



Gloss and matt varnishes have been applied on 2 colors: Orange and Reflex Blue. A comparison was made between «varnished» and «unvarnished» areas.
The behavior of both colors above is very different under the varnishing effect.
ΔE is more or less significant depending on the original color. Dark and bronzing colors like the Reflex Blue are particularly much more sensitive to the OPV.
For all color development, consider the varnish finishing and apply systematically a suitable OPV when the target color is varnished or in case of bronzing color.

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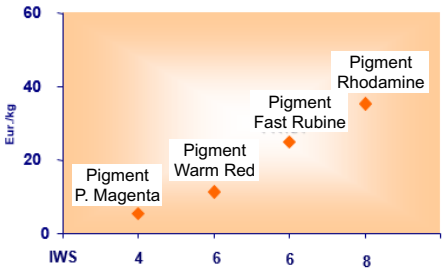
Pigments & Lightfastness

Sometimes, color prints exposed to the light are degrading.
Much damage is caused by ultraviolet radiation. Although ultraviolet light is only about 5% of solar radiation, it is responsible for 90% of damage.

The main effect of exposure to sunlight is fading of print, due to the effects of UV light on the pigments. Some pigments don't fade, but become darker and the original color then seems dirtier. The varnish may also be affected, often by yellowing over time. The lightfastness of the inks depends on the pigment's chemical structure. Generally, pigments show a higher light fastness at full strength compared to pale tints and, therefore, the lightfastness of a pigment or an ink is usually quoted at full tone and tint.

EXAMPLE: RED SHADE COLOR



The cost of a pigment may vary a lot depending on its resistance

Fading after light exposure

Original

after 10 days light exposure

after 30 days light exposure

Lightfastness evaluation

Light resistance of an ink/color prints is evaluated by comparison with a standard range by using 8 blue shades on wool. Lightfastness of these 8 colors is known, and graded regularly on the scale. This range is totally independent of temperature variations and humidity. It is an acceptable measurement scale for the light resistance determination of the most prints whatever their nature, color and intensity.
Light resistance is expressed in index on a scale from 1 (very poor) to 8 (excellent).
The light resistance is evaluated in a device equipped with a xenon lamp (XENOTEST, SUNTEST, etc.).

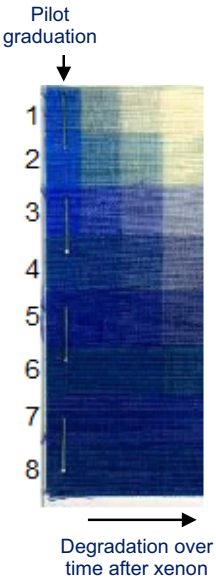
The principle is to reproduce ageing thanks to an accelerated exposure process to Xenon. A full year of sun exposure corresponds to 30 days of Xenotest exposure.

Method:
The pilot graduation and the color print sample to be evaluated are divided into 2 parts: a visible part and a hidden part. Both samples are placed in the Xenotest. The ink behavior (color degradation) is followed daily and compared to the wool scale degradation in order to determine the lightfastness index. A gray scale is used for the visual determination of color change (in accordance with ISO 105- A02). Initially, wool scale degradation is very fast: about 48 h* of exposure to reach the index 4, and then approximately 1 month* to reach 8th level on the wool scale.

*According to the lamp ageing

Sources: ISO 12040; ISO 2835; NF Q 64-002

Wool Scale



light fastness WS (Wool Scale)	Normal average days	Sommer Days
1	5	2,5
2	10	5
3	20	10
4	40	20
5	80	40
6	160	80
7	350	175
8	700	350

Many factors will disrupt the lightfastness values:

- Pigments characteristics (chemical constitution, physical state form, …)
- Pigment concentration in the ink formulation (pure/pastel shades)
- Ink coverage: Solid tone (100%)/ Halftone (<50%)
- Ink thickness (g/m²): 1 g/m² or more…
- Presence of optical brightener: lightfastness=1
- Climatic conditions: % humidity, T°C, Acid rains…

Some other devices are reproducing climatic conditions