

Ciba Specialty Chemicals



Ciba® XYMARA™ Vacuum-Metallized Pigments

Ciba® METASHEEN® series for printing inks



Effect Pigments for Printing Inks – A World of Emotions

Ciba® XYMARATM – Show Personality

Character makes a lasting impression. Personality creates loyalty.
Individuality is different.

Businesses and their products and services need to succeed in the relentless struggle against evenly matched competitors. Those who stand out from the crowd, who create a unique character and a unique image or who position themselves distinctively, will win through. Attention to detail is crucial. Ciba® XYMARATM offers you a generous palette of exceptional effect pigments – small differences that can provide your business or product with a vital competitive edge.

The cool shimmer of silver or an explosion of golden sparks – show character. Select the effects you need from the broad palette offered by Ciba® XYMARATM.

Make your vision a reality. Ciba® XYMARATM provides comprehensive solutions and the essential expertise for every stage of the added value process in the following industries:

- Automotive
- Packaging
- Paper and Graphics
- Electronics and Consumer Goods





Ciba® XYMARA™ Vacuum-Metallized Pigments

Ciba® METASHEEN® series

Ciba® METASHEEN® is a range of vacuum-metallized aluminum pigment products that deliver exceptional brilliance in metallic printing inks. Effects produced are comparable to foil blocking and metallized substrates.

Ranging in shade from unique dark chrome to a cleaner white, METASHEEN® products offer ink formulators maximum flexibility in providing metallic solutions to end users and brand owners.

METASHEEN® pigments are supplied as a 10% metal solids slurry in a range of solvents suitable for gravure and screen printing applications.

Information contained in this brochure focuses on the imaging and inks market, where formulation and application guidelines are recommended to achieve the ultimate in metallic brilliance.



Ciba® METASHEEN® Series – For a broad spectrum of applications

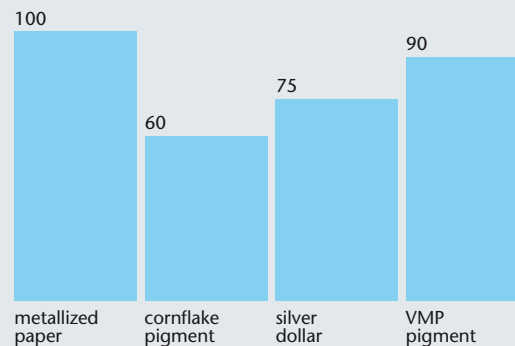
METASHEEN® metallic effect pigments compliment the Ciba Specialty Chemical range of effect pigments designed to offer access to new, spectacular and distinctive styling possibilities in a variety of end use applications, including:

- Flexible packaging
- Beer label printing
- Cosmetic packaging
- Gift wrapping
- Metal can decoration
- General label printing
- In-mould decoration screen inks

The exceptional mirror like brilliance allows packaging designers to create extremely cost-effective and eye-catching images comparable with those obtained by printing on metallized substrates.

The versatility of printing METASHEEN® inks allows the creation of high impact visual effects including drop shadows and windows. This provides an extremely cost attractive alternative to the high cost processes of de-metallization and selective metallization. The superior value in use of the METASHEEN® series compared with these applications can generally be realized when the metallic feature represents 25% or less of the overall design.

Comparative Brilliance of Metallic Products



Ciba® METASHEEN® Product Range – A full spectrum of shades for the ink industry

METASHEEN® 41 Series

Unique dark chrome effect with the highest coverage and brilliance.

METASHEEN® 71 Series

Silver effect with excellent coverage and brilliance.

METASHEEN® 91 Series

White silver effect with good coverage and brilliance.

Particularly suitable for use in combination with other colorants to produce the cleanest polychromatic shades.



Ciba® METASHEEN® Product Range

| | Metal content % | Description and solvent |
|-----------------------------|-----------------|--|
| METASHEEN® 41 Series | | Dark chrome effect |
| METASHEEN® 41-0010 | 10 | 50:50 Ethyl acetate / Iso-propyl acetate |
| METASHEEN® 41-0110 | 10 | n-propyl acetate |
| METASHEEN® 41-0310 | 10 | Dowanol PM acetate |
| METASHEEN® 41-0410 | 10 | Ethyl acetate |
| METASHEEN® 41-0710 | 10 | Dowanol PM |
| METASHEEN® 41-1110 | 10 | Butyl glycol |
| METASHEEN® 71 Series | | Silver effect |
| METASHEEN® 71-0010 | 10 | 50:50 Ethyl acetate / Iso-propyl acetate |
| METASHEEN® 71-0110 | 10 | n-propyl acetate |
| METASHEEN® 71-0310 | 10 | Dowanol PM acetate |
| METASHEEN® 71-0410 | 10 | Ethyl acetate |
| METASHEEN® 71-0710 | 10 | Dowanol PM |
| METASHEEN® 71-1110 | 10 | Butyl glycol |
| METASHEEN® 91 Series | | White silver effect |
| METASHEEN® 91-0010 | 10 | 50:50 Ethyl acetate / Iso-propyl acetate |
| METASHEEN® 91-0110 | 10 | n-Propyl acetate |
| METASHEEN® 91-0310 | 10 | Dowanol PM acetate |
| METASHEEN® 91-0410 | 10 | Ethyl acetate |
| METASHEEN® 91-0710 | 10 | Dowanol PM |
| METASHEEN® 91-1110 | 10 | Butyl glycol |

Value principle

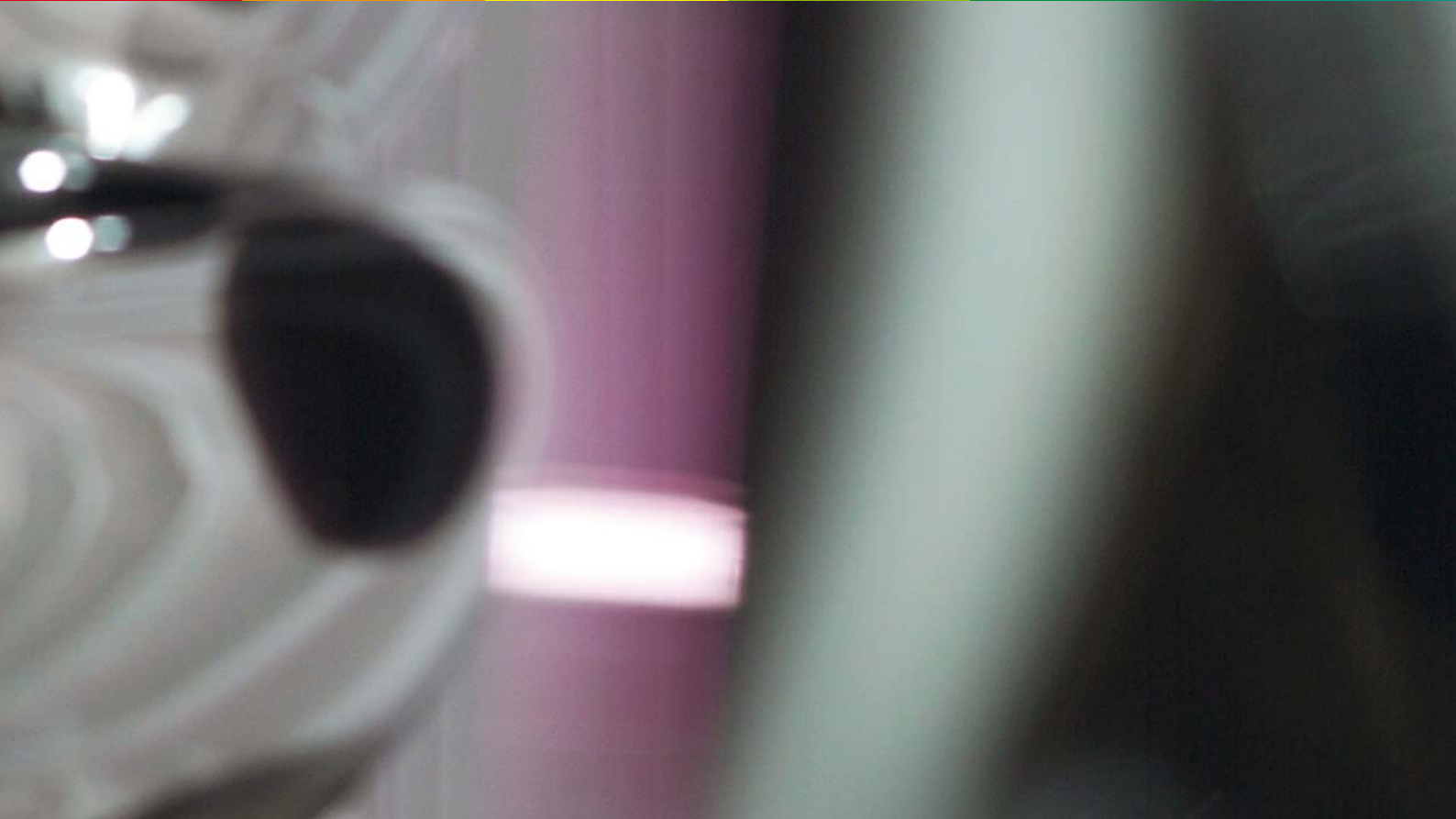
Differences in the surface areas between the three METASHEEN® grades essentially means that equal coverage can be achieved by using the following guideline: 41-Series X% Metal – ½X% • 71-Series X% Metal • 91-Series X% Metal + ½X%



Ciba® METASHEEN® Guidelines for Use

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Ciba® METASHEEN® Guidelines for Use

General principles

The flake alignment of METASHEEN® pigments can be strongly influenced by the following factors:

- Pigmentation levels
- Substrate effect
- Solvent balance
- Binder levels
- Method of incorporation
- Method of drying

Pigmentation and binder levels

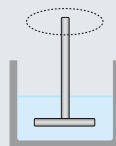
Each METASHEEN® grade will have an optimum pigmentation and associated pigment : binder ratio to achieve the desired brilliance and opacity.

| Pigment : Binder | |
|---|---|
| Low | High |
| Decreasing brilliance Decreasing opacity | Increasing brilliance Increasing opacity |

It is recommended that high viscosity/ low solids binders are used. Increasing binder solids can have a detrimental impact on the flake alignment.

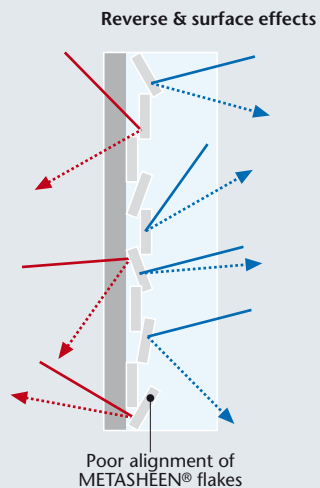
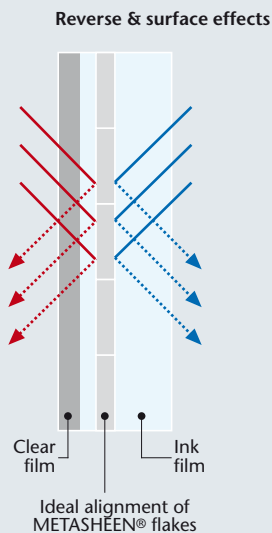
Method of incorporation

Incorporation is recommended by low shear stirring (rotor tip speed ~ 1.5 to 2.0 m/s⁻¹) at room temperature. Excessive shear should be avoided as it may have a detrimental impact on brilliance.



Substrate effect

It is recommended that for highest brilliance, METASHEEN® pigments are printed on smooth impervious surfaces. Application of a primer to uneven substrates will also enable optimum alignment of the metallic flakes. For reverse effect, high clarity, thinner films give rise to the highest brilliance.



Method of drying

Air or low temperature drying is recommended. Excessively fast drying of inks based on METASHEEN® pigments may result in misalignment of the metallic flakes for both surface and reverse effects.



Ciba® METASHEEN® Guidelines for Use

Starting point formulations

For formulating inks for gravure and screen applications, guidelines are given below.

Products used in guideline formulations

| Company | Location | Used raw material |
|--------------------------|-----------------------------------|--------------------------------|
| Nobel Enterprises | Stevenston, Ayrshire, Scotland UK | DHM10-25 (30% damped with IPA) |
| Nobel Enterprises | Stevenston, Ayrshire, Scotland UK | DLX3-5 (30% damped with IPA) |
| Eastman Chemical Company | Kingsport, Tennessee, USA | CAB 381-20 |
| Rohm and Haas | Philadelphia, PA, USA | Paraloid A21 |
| The Dow Chemical Company | Midland, Michigan, USA | Dowanol DPM |
| The Dow Chemical Company | Midland, Michigan, USA | Dowanol PM |

Gravure printing

Surface and reverse prints

| | Starting point pigmentation | |
|-------------------|--------------------------------|------------------------------|
| METASHEEN® Series | (% metal content) | Pigment : Binder ratio range |
| 41-Series | 2.0 – 3.0 | 4:1 to 1:1 |
| 71-Series | 2.5 – 3.5 | 4:1 to 1:1 |
| 91-Series | 3.0 – 4.0 | 4:1 to 1:1 |

Solvency

METASHEEN® pigments have a preference for ester rich combinations. Ink blends using higher proportions of alcohol may result in inferior printed brilliance.

METASHEEN® based inks can be run at the same viscosity as typical pigmented nitrocellulose based inks on conventional printing units without detriment to press economics.

Cylinder configuration

Excellent transfer of METASHEEN® based inks has been found when using the following cylinder configuration:

- 60° cell angle
- 70 lines per cm (dependant on design)
- 130° internal release angle
- Narrow cell walls

Screen printing

Surface print metallic ink

| | Starting point | |
|-------------------|---------------------|------------------------------|
| | pigmentation | |
| METASHEEN® Series | (% metal content) | Pigment : Binder ratio range |
| 41-Series | 2.0 to 3.0 | 1:1.5 to 1:4.0 |
| 71-Series | 3.0 to 4.0 | 1:1.5 to 1:4.0 |
| 91-Series | 3.5 to 4.5 | 1:1.5 to 1:4.0 |

Reverse print mirror ink

| | Starting point | |
|-------------------|---------------------|------------------------------|
| | pigmentation | |
| METASHEEN® Series | (% metal content) | Pigment : Binder ratio range |
| 41-Series | 4.2 to 4.8 | 1:0.8 to 1:1 |
| 71-Series | 5.0 to 5.6 | 1:0.8 to 1:1 |

Solvents

The use of solvents with low evaporation rates is recommended.

Mesh sizes

Inks based on METASHEEN® pigments can be printed on mesh sizes ranging from 60 lines/cm to 150 lines/cm.

Squeegee

Polyurethane squeegees with an average hardness of 60 to 80 shore durometer are recommended.

Drying

Air drying is recommended for mirror inks. Jet drying may be suitable for metallic inks after appropriate checks are made.



Ciba® METASHEEN® Guidelines for Use

Introducing color

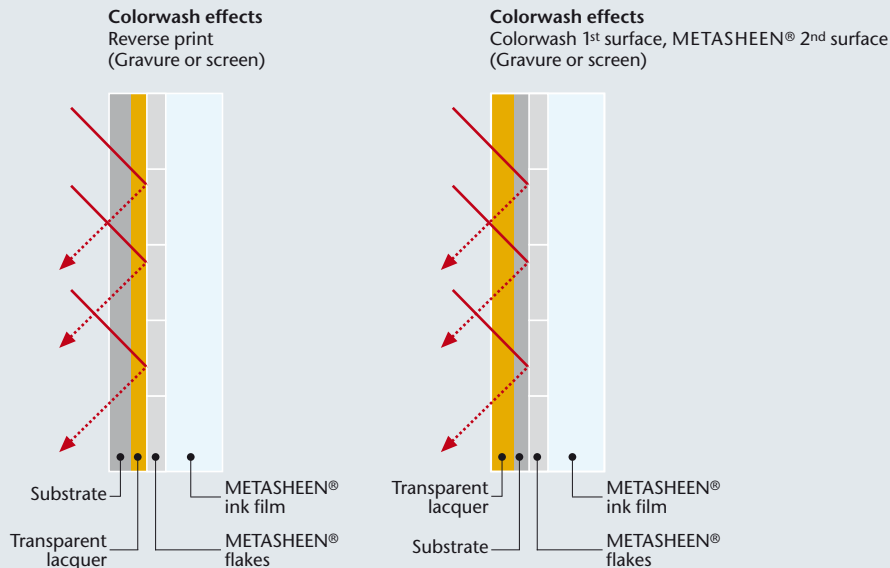
Spectacular colored metallic effects can be created from each of the METASHEEN® grades through the application / incorporation of:

- Ciba® ORASOL® solvent dyes
- Ciba® IRGALITE®, Ciba® CROMOPHTAL® and Ciba® CINQUASIA® transparent pigments
- Ciba® MICROLITH® transparent pigment preparations

Colorwash effects

A strong, vivid effect can be created for either surface or reverse viewing by overprinting with a transparent lacquer based on the above products. For maximum effect it is recommended that the colorwash system is formulated to have a minimum re-solubility effect on the METASHEEN® layer.

The maximum effect can be achieved when the colorwash is printed on the first surface with the METASHEEN® ink reverse printed on the second surface.



Polychromatic effects

For ease of use, a transparent ink can be incorporated, with low shear, into the METASHEEN® ink where addition is recommended just prior to printing to achieve the best effect. The transparent, colored ink should be based on a formulation that does not have an adverse effect on the METASHEEN® pigment, for example it should not have a high alcohol content or incompatible binder.

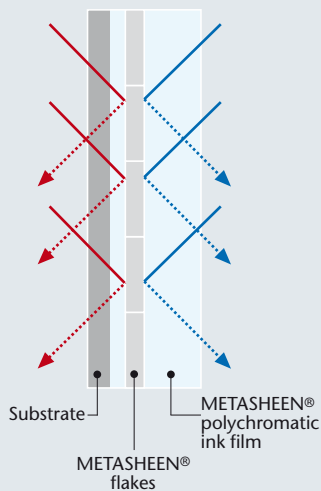
Color reproduction with

Ciba® COLIBRI™ software

The matching of shades for colorwash applications can be achieved by utilizing Ciba® COLIBRI™ software. This contains extensive color matching libraries for pigments and dyes in combination with METASHEEN® base inks.

For more information please refer to your local sales representative.

Polychromatic effects Reverse & surface effects (Gravure or screen)



Ciba® METASHEEN® Guidelines for Use

Printed formulations

Gravure print formulations

| Metallic final ink | | 41-Series | 71-Series | 91-Series |
|----------------------------------|---|-----------|-----------|-----------|
| METASHEEN® slurry type | | 41-0010 | 71-0010 | 91-0010 |
| Slurry weight | % | 25 | 30 | 40 |
| Varnish 1 | % | 8.3 | 10 | 13.3 |
| Ethyl acetate | % | 29.6 | 25.5 | 17.9 |
| n-propyl acetate | % | 37.1 | 34.5 | 28.8 |
| Pigmentation | % | 2.5 | 3 | 4 |
| Pigment : Binder | | 3:1 | 3:1 | 3:1 |
| Ethyl acetate : n-propyl acetate | | 1:1 | 1:1 | 1:1 |
| Ink flow – Zahn 2 (secs) | | 25 | 25 | 25 |

Colorwash formulation

| | | |
|--|---|------|
| Ciba® ORASOL® Yellow 2RLN | % | 1.34 |
| Ciba® ORASOL® Orange G | % | 0.66 |
| Varnish 2 | % | 73.1 |
| Ethyl acetate | % | 0.9 |
| n-propyl acetate | % | 24 |
| Ciba® ORASOL® Yellow 2RLN : Ciba® ORASOL® Orange G | | 2:1 |
| Ethyl acetate : n-propyl acetate | | 1:1 |
| Ink flow – Zahn 2 (secs) | | 22 |



| Polychromatic final ink | | 41-Series | 71-Series | 91-Series |
|----------------------------------|---|-----------|-----------|-----------|
| METASHEEN® slurry type | | 41-0010 | 71-0010 | 91-0010 |
| Slurry weight | % | 25 | 30 | 40 |
| Varnish 1 | % | 8.3 | 10 | 13.3 |
| Dye concentrate | % | 20 | 20 | 20 |
| Ethyl acetate | % | 19.6 | 16.4 | 7.3 |
| n-propyl acetate | % | 27.1 | 23.6 | 19.4 |
| Pigmentation | % | 2.5 | 3 | 4 |
| Dye concentration | % | 2 | 2 | 2 |
| Pigment : Binder | | 3:1 | 3:1 | 3:1 |
| Ethyl acetate : n-propyl acetate | | 1:1 | 1:1 | 1:1 |
| Ink flow – Zahn 2 (secs) | | 25 | 25 | 25 |

| 10% Dye concentrates | | |
|--|---|------|
| Ciba® ORASOL® solvent dyes | % | 10 |
| Varnish 2 | % | 45.5 |
| Ethyl acetate | % | 4.5 |
| n-propyl acetate | % | 40 |
| Final concentrate | | |
| Ciba® ORASOL® Yellow 2RLN : Ciba® ORASOL® Orange G | | 2:1 |

| Varnish 1 | | |
|---------------|---|------|
| DHM10-25 | % | 14.3 |
| Ethyl acetate | % | 85.7 |

| Varnish 2 | | |
|---------------|---|------|
| DLX3-5 | % | 31.4 |
| Ethyl acetate | % | 68.6 |



Ciba® METASHEEN® Guidelines for Use

Printed formulations

Screen print formulations for surface printed metallic effect ink

| Metallic final ink | | 41-Series | 71-Series | 91-Series |
|------------------------|---|-------------|-------------|-------------|
| METASHEEN® slurry type | | 41-0710 | 71-0710 | 91-0710 |
| Slurry weight | % | 21-24 | 31-34 | 39-42 |
| Varnish 1 | % | 22-26 | 26-30 | 30-34 |
| Varnish 2 | % | 3-6 | 3-6 | 3-6 |
| Dowanol PM | % | 0-10 | 0-10 | 0-10 |
| Dowanol DPM | % | 35-40 | 30-35 | 25-30 |
| Pigmentation | % | 2.1-2.4 | 3.1-3.4 | 3.9-4.2 |
| Pigment : Binder | | 1:1.7-1:2.2 | 1:1.7-1:2.2 | 1:1.7-1:2.2 |

| Colorwash formulation | | |
|---------------------------------|---|-------|
| Standard UV based clear varnish | % | 99.54 |
| Ciba® ORASOL® Yellow 2RLN | % | 0.31 |
| Ciba® ORASOL® Orange G | % | 0.15 |



| Polychromatic final ink | | 41-Series | 71-Series | 91-Series |
|---------------------------|---|-------------|-------------|-------------|
| METASHEEN® slurry type | | 41-0710 | 71-0710 | 91-0710 |
| Slurry weight | % | 17-20 | 24-28 | 32-35 |
| Varnish 1 | % | 20-24 | 24-28 | 28-32 |
| Varnish 2 | % | 3-6 | 3-6 | 3-6 |
| Dowanol PM | % | 0-10 | 0-10 | 0-10 |
| Dowanol DPM | % | 35-40 | 30-35 | 25-30 |
| Ciba® ORASOL® Yellow 2RLN | % | 4.7 | 4.7 | 4.7 |
| Ciba® ORASOL® Orange G | % | 2.3 | 2.3 | 2.3 |
| Pigmentation | % | 1.7-2.0 | 2.4-2.8 | 3.2-3.5 |
| Dye concentration | % | 7 | 7 | 7 |
| Pigment : Binder | | 1:1.7-1:2.2 | 1:1.7-1:2.2 | 1:1.7-1:2.2 |

| Varnish 1 | | |
|-----------------|---|------|
| CAB-381-20 | % | 15 |
| n-Butyl acetate | % | 25.5 |
| Dowanol DPM | % | 59.5 |

| Varnish 2 | | |
|--------------|---|----|
| Paraloid A21 | % | 30 |
| Dowanol PM | % | 70 |



Ciba® METASHEEN® Guidelines for Use

Printed formulations

Screen print formulations for reverse printed mirror effect ink

| Metallic final ink | | 41-Series | 71-Series |
|------------------------|---|-------------|-------------|
| METASHEEN® slurry type | | 41-0710 | 71-0710 |
| Slurry weight | % | 42-48 | 50-56 |
| Varnish 1 | % | 15-19 | 15-19 |
| Varnish 2 | % | 3-6 | 3-6 |
| Dowanol PM | % | 0-10 | 0-10 |
| Dowanol DPM | % | 28-33 | 28-33 |
| Pigmentation | % | 4.2-4.8 | 5.0-5.6 |
| Pigment : Binder | | 1:0.8-1:1.0 | 1:0.8-1:1.0 |

| Colorwash formulation | | |
|---|---|------|
| Standard solvent based clear varnish | % | 71 |
| Ciba® ORASOL® Yellow 2RLN | % | 0.47 |
| Ciba® ORASOL® Orange G | % | 0.23 |
| Standard solvent based retarder solvent | % | 8.3 |
| Standard solvent based thinner solvent | % | 20 |



| Polychromatic final ink | | 41-Series | 71-Series |
|---------------------------|---|-------------|-------------|
| METASHEEN® slurry type | | 41-0710 | 71-0710 |
| Slurry weight | % | 38-44 | 43-49 |
| Varnish 1 | % | 15-19 | 15-19 |
| Varnish 2 | % | 3-6 | 3-6 |
| Dowanol PM | % | 0-10 | 0-10 |
| Dowanol DPM | % | 28-33 | 28-33 |
| Ciba® ORASOL® Yellow 2RLN | % | 4.8 | 4.8 |
| Ciba® ORASOL® Orange G | % | 2.4 | 2.4 |
| Pigmentation | % | 3.8-4.4 | 4.3-4.9 |
| Dye concentration | % | 7.2 | 7.2 |
| Pigment : Binder | | 1:0.8-1:1.0 | 1:0.8-1:1.0 |

| Varnish 1 | | |
|-----------------|---|------|
| CAB-381-20 | % | 15 |
| n-Butyl acetate | % | 25.5 |
| Dowanol DPM | % | 59.5 |

| Varnish 2 | | |
|--------------|---|----|
| Paraloid A21 | % | 30 |
| Dowanol PM | % | 70 |



Ciba® XYMARTM METASHEEN®

Reverse Print Effect on 50µm Polyester Film – Gravure

91-Series White Silver Effect

71-Series Silver Effect

41-Series Dark Chrome Effect

Colorwash Effect with Ciba® ORASOL® Solvent Dyes

Polychromatic Effect with Ciba® ORASOL® Solvent Dyes

Ciba® XYMARATM METASHEEN®

Surface Print Effect on 175µm Polycarbonate Film – Screen – Metallic Ink

91-Series White Silver Effect

71-Series Silver Effect

41-Series Dark Chrome Effect

Colorwash Effect with Ciba® ORASOL® Solvent Dyes

Polychromatic Effect with Ciba® ORASOL® Solvent Dyes

Ciba® XYMARTM METASHEEN®

Reverse Print Effect on 175µm Polycarbonate Film – Screen – Mirror Ink

71-Series Silver Effect

41-Series Dark Chrome Effect

Colorwash Effect with Ciba® ORASOL® Solvent Dyes

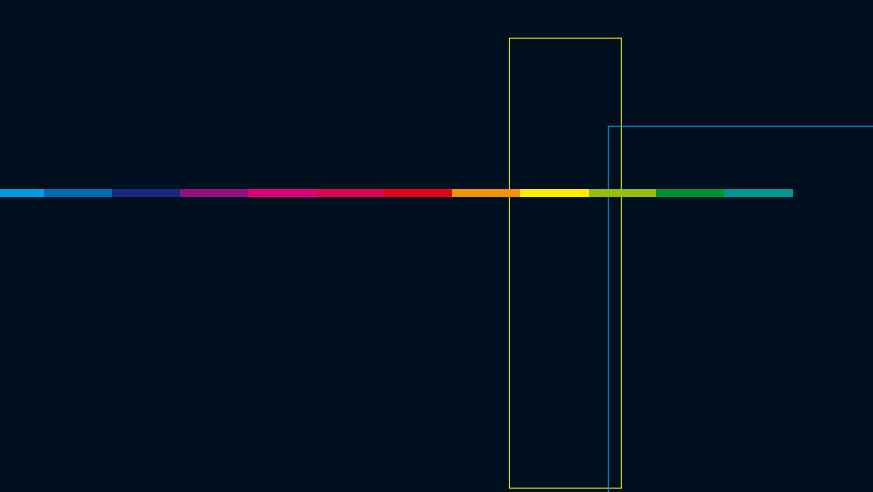
Polychromatic Effect with Ciba® ORASOL® Solvent Dyes

Ciba Specialty Chemicals – Create Value

Our specialty chemicals, added in small quantities, improve existing or add new qualities to materials at every stage of their production process. As well as products, Ciba Specialty Chemicals offers a wide range of knowledge-based services and expertise, providing customers with complete solutions to enhance their businesses. All our business activities are driven by five major values:

- Performance – We are committed, reliable and credible.
- Customer first – We are dedicated to the success of our customers.
- Innovation – We innovate across the whole company.
- Leadership – We lead by example.
- Sustainability – We create sustainable value.

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Value beyond chemistry