

Substrate priming with DigiPrime 4431

for HP Indigo Industrial Presses

How-to Guide



Substrate Priming with DigiPrime 4431

Who can benefit from reading this document?	2
Introduction	2
Why use substrate primers	2
Introducing the new DigiPrime 4431 substrate primer	3
Evaluation of the new DigiPrime 4431 substrate primer	3
Evaluation Procedure	3
Performance Criteria	4
Findings	4
Coating weight	4
Substrate surface	5
Notes	5
Conclusions	5
Evaluation Environment	6
Suppliers of Substrates and Coating Machines used	7
Regulatory Information	7



Who can benefit from reading this document?

This how-to guide is intended for press owners and operators who optimize their printing media using substrate primer coatings.

The guide serves as a starting point for experimentation with DigiPrime primer, substrates, coating weights and coating machines.

This guide is applicable to the HP Indigo press ws2000 / ws4000 / ws4050 presses.

Introduction

Why use substrate primers

Primers are coatings applied to substrates to achieve maximum printing performance. High quality digital printing requires substrates to have high levels of chemical and physical consistency. Most synthetic substrates can be upgraded to such levels with the application of substrate primers.

Primers can be applied to suitable substrates at the client site to reduce costs and increase substrate diversity. A variety of Flexo and Gravure coating machines can be used for this purpose.

Substrate primers improve ElectroInk transfer, fixing and adhesion. They also maximize the life span of press consumables, like the PIP foil and machine blanket.



Introducing the new DigiPrime 4431 substrate primer

DigiPrime is a series of speciality substrate primers developed by Michelman Inc. The DigiPrime series has been approved and recommended for use on coated paper, uncoated paper and certain Polyethylenes (PE), by mass substrate converters and optimized media manufacturers.

DigiPrime 4431 is a highly versatile primer used for coating papers substrates and synthetic film. It boasts a number of advantages over existing primers, including excellent chemical stability during storage. It's water-based formulation makes it operator and work place friendly.

Evaluation of the new DigiPrime 4431 substrate primer

HP Indigo testing laboratories conducted extensive coating and print tests to evaluate the new DigiPrime 4431 primer. Test results show that DigiPrime 4431 is suitable for use with all HP Indigo industrial presses, and is compatible with a wide range of substrates.

Evaluation Procedure

The evaluation was conducted in two stages, first coating evaluations and then printing evaluations.

HP Indigo manufactures a number of high quality primers, including the Topaz primer used for uncoated papers and synthetics films. This primer was used as the reference primer during the evaluation.

The evaluation was conducted using four different substrates. Thousands of meters of each substrate were coated with DP 4431 and the reference primer. All coatings were applied at the same target coating weight, to achieve uniformity during the evaluation.



Performance Criteria

The following performance criteria were defined for each stage of the evaluation.

Coating evaluation criteria

- **Runnability** - The substrate's ability to run smoothly through the coating machine.
- **Primer adhesion** - Primer to substrate adhesion at target coating weight.
- **Ease of use** - The ease of tasks performed before, during and after coating.
- **Coating appearance** - Overall coated substrate appearance, face and roll side.

Printing evaluation criteria

- **Runnability** - The ability of the coated substrate to run smoothly through the press.
- **Ink transferability** - The quality of ink transfer from blanket to substrate.
- **Blanket-substrate compatibility** - Blanket-substrate interaction. Stress modes.
- **Ink-substrate interaction** - The degree of ink to substrate adhesion. Stress modes.

Findings

DigiPrime 4431 performed equally or better than the reference coating. A longer coating shelf life was evident in several substrates. This was demonstrated by DigiPrime 4431's high ink adhesion, even when printing several months after coating was applied.

DigiPrime 4431 interacts better than the reference coating with machine consumables. It has better second-transfer performance especially when transferring small dots, enhancing print quality.

Coating weight

Optimal substrate coating weight depends on the substrate used, the specific print requirements and the coating system. In general, decreasing the coating weight reduces the possibility of "blocking phenomena". (This occurs mostly with high-gloss substrates, where the smooth surfaces may stick together.)

- **Uncoated paper substrates** - Uncoated paper has a high absorption factor. Coating weights should be increased to extend the shelf life of these substrates.
- **PE labels** - Several PE labels achieved better adhesion and appearance when the DigiPrime 4431 was diluted with 20% deionized water.

Substrate surface

- **Surface tension** - Consistent substrate surface tension is crucial for wetting and adhesion. This is especially true for water-based coatings.
- **Corona treatment for synthetic film substrates** - Corona treatment is a prerequisite for adhesion of coatings to synthetic films. Refreshing the corona is recommended for best results.
Recommended corona treatment levels:
 - BOPP - 38 - 40 Dyne/cm
 - PE - 42 - 44 Dyne/cm
 - PET (12 microns) - 52 - 54 Dyne/cm
- **Top coated substrates** - Top coated substrates and corona-replace coatings should be avoided. These coatings generally react negatively the reference primer, and prevent the proper adhesion of DigiPrime to the substrate. Lack of primer-to-substrate adhesion and short primer-substrate shelf life is evident when primer is applied to top-coated substrates.

Notes

- Drying conditions must be carefully controlled to ensure good coating quality. The substrate should be relatively cool when it reaches the rewinder (less than 40°C), to avoid any blocking issues.
- ESD (electrostatic discharge) issues generally occur when coating and printing on synthetic film. Discharge excess static using anti-static devices. Alternatively ESD can be prevented by using humidifiers.

Conclusions

- DigiPrime 4431 is compatible with a wide variety of paper and film substrates, for direct coating, with no need for additional additives.
- This water-based emulsion has clear advantages for operators.
- Every print job is different. We recommend application-specific testing be performed to determine optimal substrate, primer and coating weight combinations.
- Other factors must be considered, such as the type of substrate, the subsequent printing stages and the final application. For example, varnishing, laminations and converting.
- We highly recommend the use of the DigiPrime 4431.

Evaluation Environment

The evaluation environment consisted of the following:

Substrates Tested

- PET 12 micron transparent, excell, Saehan, Korea.
- BOPP 38 micron white cavitated, Dor Film, Israel.
- Uncoated paper, Hadar Top 90gr, Bondi AIPM, Israel.
- PE 85 clear face stock label, Raflatac, Germany.

Coating machine used

Coral RR, model 675 CI, flexo machine, U/TECO Italy.

Set up

- Coating speed - 90 - 100 meters/min
- Oven - hot air
- Length - 2.75 meters
- Temperature - 1st zone: 60°C to 80°C
- 2nd zone: 60°C to 80°C

Anilox

- DigiPrime
 - 160 lpcm, 11 micron depth.
 - theoretical volume: 5.2 cc
- Topaz 10
 - 100 lpcm, 50 micron depth
 - Theoretical volume: 13.6 cc

Primers

- Topaz 10 - HP Indigo (reference for films and uncoated paper)
- DigiPrime 4431 - Michelman, nvs 28%

Average coating weights

- Topaz - 300 - 350 mg/sqm
- DigiPrime - 300 - 400 mg/sqm

Suppliers of Substrates and Coating Machines used

Coating Machine

Uteco spa - www.uteco.com/flexo.asp?pg=scheda&lang=it&prod=Coral

Primer

Michelman inc. - www.michem.com/digiprime

Substrates

Dor film - www.dorfilm.com

Toray Saehan - www.toraysaehan.co.kr

Raflatac - www.raflatac.com

Bondi AIPM - www.mbpha.co.il/index_e.html

Regulatory Information

Based in information provided by the supplier, DigiPrime 4431 does not contain any hazardous or carcinogenic components, requiring disclosure under OSHA 1910.1200. The components of this product are listed on the following approved chemical inventories:

TSCA - USA

EC (EINECS) - Europe

DSL - Canada

KECI - Korea

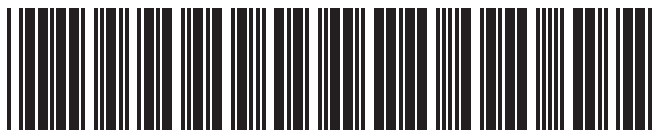
CHINA - China

For further information on the product contact Michelman Inc. (<http://www.michem.com/>)

Copyright © 2006 Hewlett-Packard Company

This is an HP Indigo digital print. Printed in Israel.

www.hp.com/go/indigo



reorder: P/N CA294-03930

