



# DiPaMat

## Technical Data Sheet DiPaMat™ Legend Ink Wh04

UV curable white inkjet ink for legend printing

August 2016

DiPaMat



**AGFA**   
Materials

<b>PRODUCT overview</b>		
<b>Description</b>	<b>Packing unit</b>	<b>Order code</b>
DiPaMat™ Legend Ink Wh04	2 x 0,9 L	40HKE
DiPaMat™ Cleaning Solution 01 02	2 x 1 L	4NQRK

DiPaMat™ Legend Ink Wh04 is a non toxic, highly opaque white UV-curable legend, marking and nomenclature ink.

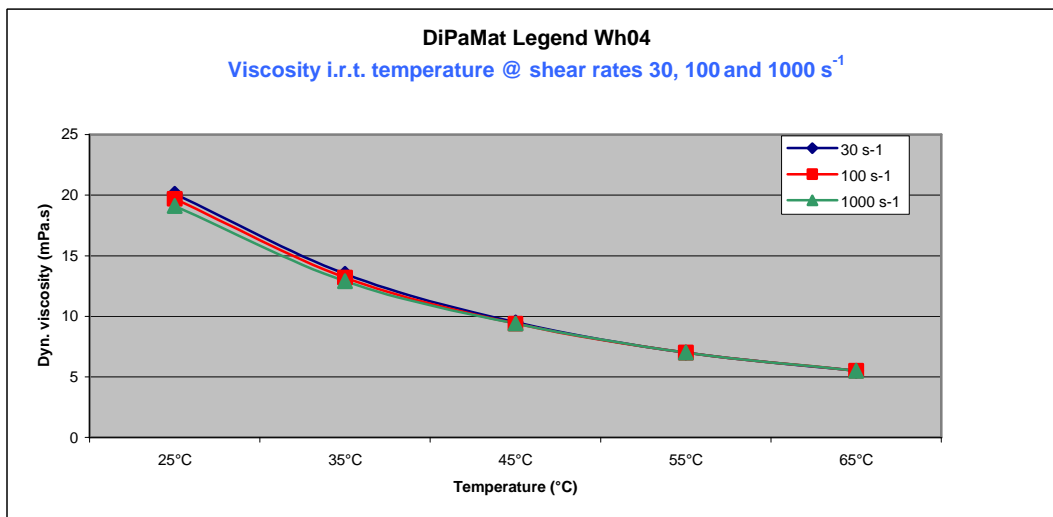
The ink is designed for application on both semi- and fully cured solder mask by means of inkjet technology and is curable with LED.

## FEATURES

- High opacity white ink and non yellowing
- Fast UV curing with doped, non-doped Hg bulb and other UV lamp types
- Fast UV curing with LED (395nm, 385nm and 365nm)
- Excellent jetting performance and robustness on industrial print heads
- Excellent image quality
- Excellent adhesion and hardness to both semi and fully cured solder mask
- Low sedimentation behavior with high recovery power
- Non toxic
- Good shelf life
- RoHS and REACH compliant; halogen free
- No volatile organic components

## INK PROPERTIES

- Color: Bright White
- Static Surface Tension: 21.0 – 24.0 mN/m @ 25°C (Krüss K9 Tensiometer)
- Density (25°C): 1.18 – 1.22 g/cm<sup>3</sup> (Paar DM60/DMA602)
- Viscosity : 9.0 – 11.0 mPa.s (45°C @ shear rate 1000 s<sup>-1</sup> Haake Rotovisco 1)
- Dynamic viscosity (AR2000 Rheometer)



## PRINTER / PRINTHEAD PLATFORM

- Suitable in printing systems equipped with industrial piezo print heads
- Typical printing mode for DiPaMat™ Legend inks includes :
  - ✓ Jetting temperature : broad window, typical jetting at 38°C to 45°C
  - ✓ Printing mode : suited for binary printing and grey scale printing, for single pass printing and multi pass printing
  - ✓ Opacity depends on drop volume applied

**Important note:** These settings are shown as example. The operation mode is not limited to these settings. Furthermore, the printing mode depends on the choice of the substrate, printing resolution, etc.

## APPROVED BY

DiPaMat™ Legend Ink Wh04 is tested and approved by these printer manufactures:

Microcraft	<a href="http://www.microcraft.jp">www.microcraft.jp</a>
Orbotech	<a href="http://www.orbotech.com">www.orbotech.com</a>
First EIE	<a href="http://www.firsteie.com">www.firsteie.com</a>
Adeon	<a href="http://www.adeon.nl">www.adeon.nl</a>
Hi-Print	<a href="http://www.hi-print.com.cn">www.hi-print.com.cn</a>
Wingate	<a href="http://www.sz-wg.com">www.sz-wg.com</a>

## CURING

DiPaMat™ Legend Ink Wh04 ink can be cured by both LED's and Hg Lamps:

- Suitable to cure with LED 395 nm, 385 nm and 365 nm. Required energy for LED 395 nm is less than 200mJ/cm<sup>2</sup>.
- When exposed to a non doped mercury lamp (H-bulb) – up to speeds more than 70 m/min.
- UV readings @10 m/min @100%:

	Irradiance	Energy Density
UVA	2020 mW/cm <sup>2</sup>	600 mJ/cm <sup>2</sup>
UVB	1670 mW/cm <sup>2</sup>	470 mJ/cm <sup>2</sup>
UVC	330 mW/cm <sup>2</sup>	93 mJ/cm <sup>2</sup>
UVV	1180 mW/cm <sup>2</sup>	350 mJ/cm <sup>2</sup>

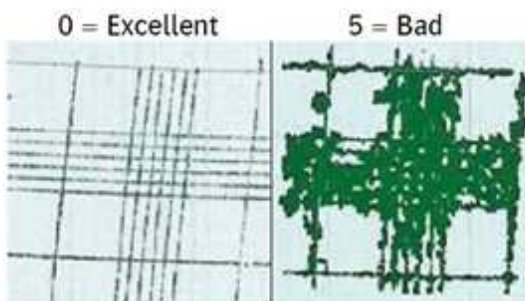
- Suitable to cure when exposed to one iron-doped mercury lamp (D-bulb) of 600 W/inch up to printing speeds of 50 m/min
- Suitable to cure with metal halide UV lamp (A-bulb)
- Thermal cure: 150°C for 20 min to 60 min

## SEDIMENTATION AND RECOVERY

DiPaMat™ Legend Ink Wh04 shows low sedimentation and high recovery behavior. After the printer is idle for a period of 3 days, one or two flushing sessions of ink (3-5 ml) are sufficient to start printing with all nozzles active.

## ADHESION

- DiPaMat™ Legend Ink Wh04 printed on different types of semi and fully cured solder masks (from different suppliers) which are thermally cured during 20 minutes at 150°C shows excellent adhesion
- The adhesion is evaluated by cross hatch and tape test method according to standard ISO2409



- On a wide variety of semi and fully cured solder masks test results were obtained between 0 and 2. The adhesion on fully cured solder mask is more critical but improves when the thermal curing time is extended. 60 minutes at 150°C is the optimal condition for thermal curing.

## PENCIL HARDNESS

- DiPaMat™ Legend Ink Wh04 printed on different types of solder masks (from different suppliers) which are thermally cured during 20 minutes at 150°C shows a pencil hardness of > 7 H
- Pencil hardness is tested according to standard ASTM D3363-05



## COMPLIANCE TO INDUSTRY STANDARDS

Standard	Method	Result
Resistance to solvents	MIL PRF 55110G § A.3.7.3.2 and A.4.8.3.2	PASSED Test report available
Marking adhesion	MIL PRF 31032/2B §3.7.4.1 and 4.7.4.1 IPC-TM-650 §2.4.1 IPC-J-STD-003B	PASSED Test report available
Adhesion tape	ISO2409 cross cut	PASSED Ink on semi cured solder mask: 0-1 Ink on fully cured solder mask : 0-2
Pencil Hardness	ASTM D3363-05	PASSED Ink on semi cured solder mask: 8H-9H Ink on fully cured solder mask: 7H-9H
Resistance: Chemical	IPC-TM-650 §2.3.4rev.B	PASSED Test report available
Resistance: Solder	Solder limits: 288°C 20 sec	Cfr. UL-file E335687
Resistance: HASL	Customer test	PASSED
Resistance: Ni/Au	Customer test	PASSED
Resistance: Sn immersion	Customer test	PASSED
IR reflow	Customer test	PASSED
Halogen free	Manufacturer EHS policy	Conform IEC 61249-2-21
RoHS	Manufacturer EHS policy	Conform EU directive : 2005/618/EC Test report available
REACH	Manufacturer EHS policy	No SVHC listed products cfr. MSDS
Flammability	Underwriters Laboratories UL standard : UL746E Vertical burning	PASSED UL-file : E335687 Test report available
Outgassing	ASTM E 595-07 TML-WVR < 1.0 % CVCM < 0.1 %	PASSED TML-WVR : 1.01-0.78 = 0.23% CVCM : < 0.01 % Test report available

## PACKAGING

DiPaMat™ Legend Ink Wh04 is available in 1 L bottles. The bottles are filled with 0,9 l legend ink, leaving some space for better agitation. One order code is one shipping carton that contains 2 bottles i.e. 1,8 l of legend ink.

## SHELF LIFE

9 Months when stored under recommended conditions

## STORAGE

Recommended storage conditions (in Agfa bottles)

- 4°C to 23°C (39°F to 75°F): preferably 4°C to 10°C
- Out of direct sunlight
- Away from heat and (UV)-radiation sources

## RECOMMENDATIONS FOR BEST PERFORMANCE

Instructions for use :

- Check the compatibility of the ink / IJ-head / IJ-printer with the supplier
- When converting to Agfa ink from a different ink supplier it is mandatory to flush the IJ-system with the designated cleaning chemical
- Keep the ink in the sealed and closed bottle inside the cardboard box until usage
- 12 hours before use the ink must be preconditioned at room temperature
- Verify the expiry date of the ink
- Shake the bottle of ink well for at least 1 minute before use in the printer
- When adding ink to the printer, empty the whole content of the bottle if possible
- Protect the ink from unintended UV exposure
- Best adhesion and pencil hardness of the ink on the solder mask is obtained by:  
UV-curing with a Mercury UV lamp or LED 395/385 nm (cfr. Paragraph curing) followed by a baking step of 20 to 60 minutes at 150°C.

Solder mask types / conditions :

- DiPaMat™ Legend Ink Wh04 was tested on different brands and types of solder mask at different curing levels. The solder masks can be applied with different techniques (curtain coating, screen print, spray, ED, dry film).
- The adhesion and pencil hardness of the applied legend ink is better on semi cured versus fully cured solder masks
- When a UV-bump of the solder mask - for achieving a better solder ball resistance afterwards - is required, it is better to give this treatment after printing of the legend ink for a better adhesion

## ENVIRONMENTAL, HEALTH & SAFETY

The DiPaMat™ Legend inks have been developed in accordance with Agfa's environmental policy and responsibility for its products. The ingredients used in these UV curable inks have been specifically selected to have no toxicity and can be safely handled as long as routine precautions are taken. For information on ingredients as well as on recommendations or information on environmental, health and safety issues, we refer to the Material Safety Data Sheets (MSDS) of these inks.

**DiPaMat is a trademark of AGFA.**

**Ink development and manufacturing processes are executed according to the Quality Management System of Agfa, which is ISO9001 certified.**

### Disclaimer:

The information and recommendations contained in this Technical Datasheet are based on AGFA in-house testing of the products, according to our knowledge. However, no guarantee is given regarding the applicability for any specific application of these products, because the results may vary with variation in the substrates and specific conditions. All users should therefore make their own tests to verify that any particular requirement for the printing process and for the end-user are fully met when using the AGFA products. While all information in this Technical Datasheet is provided in good faith the users bear sole responsibility for the use of the AGFA products for their specific user applications.

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