

# TECHNICAL REPORT

Good news for the persons in charge of smartphone development who want to achieve both high quality decoration and post-processability to the glass!

## Ink for glass which has three excellent functions

### GIZ-HF ink series excellent resistance for solvent and adhesive

We will introduce the glass ink that achieves both three functions contributing to excellent post-processing and energy cost reduction, and high-quality printing.



## 1. Three excellent functions of GIZ-HF ink series

GIZ-HF ink series is screen printing ink for glass which has three excellent functions:

1. Excellent resistance to solvent and adhesive
2. Printed ink layer with high dyne value
3. Low temperature drying property

### Excellent solvent resistance and adhesive resistance

GIZ-HF ink series has high solvent resistance against MEK (methyl ethyl ketone) and acetone, etc. Moreover, it has higher adhesive resistance than conventional glass inks too. Problems such as discoloration by heat of printed ink layer where adhesive is coated can be resolved thanks to these excellent resistance to solvent and adhesive.

### Printed ink layer with high and stable dyne value

Dyne value of printed ink layer (\*) of conventional ink used to be around 35, but GIZ-HF ink series raised its value to 42 or more. Wettability of printed ink layer can improve by raising dyne value of printed ink layer. This wettability improvement contributes to enhancing adhesion property between printed ink layer and adhesives or double sided tape.

\* Dyne value means surface free energy (surface tension). The unit is usually shown by mN/m or dyn/cm.

### Low temperature drying property

GIZ-HF ink series is possible to be dried at lower temperature (120°C) than conventional glass inks which are dried at 150°C. Reduction of costs for energy and production is possible by low temperature drying property.

## 2. The list of benefits can be obtained from excellent functions

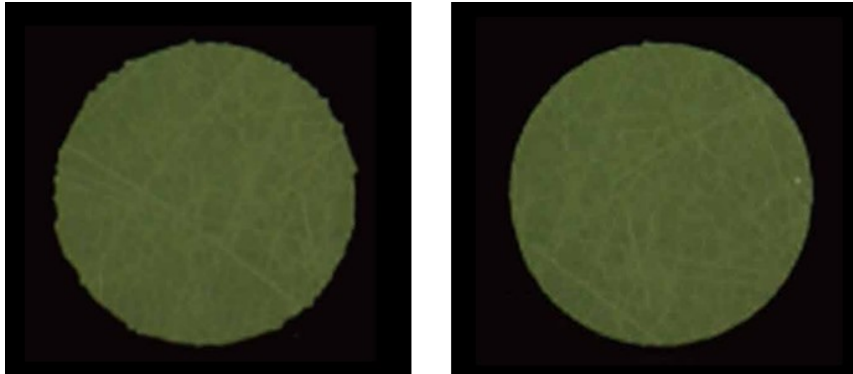
Benefits obtainable	Functionality used and its effects
Excellent post-processing property	Easy to assemble by using an adhesive after printing process since printed ink layer has excellent solvent and adhesive resistance and its high dyne value. Weight reduction and process reduction are promising by replacing assembly with screws.
Deduction of energy cost	GIZ-HF ink series dries at lower temperature (120°C) than conventional glass inks which dry at 150°C. Therefore, it can reduce energy cost for drying process and contributes to reduction of production cost.
High quality printing	Excellent ink physical property realizes smooth edge of printing without unevenness (details described in later section)
Compliance with environmental standard	Halogen (chlorine: Cl, bromine: Br) compounds are not used intentionally in raw materials. Since benzene, toluene, xylene and isophorone are not also used, it is easy to comply with environmental regulations. (Cl ≤ 900ppm, Br ≤ 900ppm, Cl+Br ≤ 1500ppm)

### 3. Introduction of high quality printing of GIZ-HF ink series

#### High quality printing of GIZ-HF ink series

GIZ-HF ink series, with its excellent physical property, enables beautiful printing edges without unevenness and printing with sharp fine lines.

Example shows the realization of beautiful edges (black solid outline printing of a round shape (1mm diameter). High dyne ink (right) has smoother printing edges without roughness than conventional ink (left).



Example shows outlines of fine lines printed on smartphone frames. Please refer to the enlarged photo (right), you can find a fine line is reproduced beautifully.



Example shows that outline printing with various sizes of round shapes (smallest about 1mm diameter) are applied on smartphone frames.

