

Glow-in-the-dark inks

Decoration of products with screen-printed glow-in-the-dark effects

Screen

2025

30. Jan

Photoluminescent, so-called “glow-in-the-dark” inks, contain inorganic phosphorescent pigments. When the printed ink film is exposed to artificial light or daylight, these pigments absorb the energy (electrons are raised to a higher energy level). Later, in the dark, the stored energy is released again as visible light (electrons return to initial state).

Phosphorescent inks work according to this principle and make warning signs glow in the dark.



The pigment choice depends on the application and the ink price. Today, screen printing is used for glow-in-the-dark signs since the pigment size can be up to 60 µm and the thickness of the printed ink layer is important for the afterglow quality.

No other printing process can keep up with the benefits screen printing has to offer for this application – including the large range of possible substrates.

This TechINFO provides background information on relevant Marabu products and their processing.

Content

- 1.0 Application fields**
- 1.1 General graphic applications**
- 1.2 Long-term phosphorescent safety signage**

- 2.0 Glow-in-the-dark ink Mara® Glow GW**

- 3.0 Properties and processing**

- 4.0 Protective varnish and further processing**

- 5.0 Remarks**

1.0 Application fields

1.1 General graphic applications

This includes products with a short afterglow such as greeting cards or stickers (approximately 30 min).

Generally, there are no specified requirements in terms of the duration of afterglow for these products, but they must be inexpensive and easy to use. The pigments used have a low stability when exposed to UV light and are sensitive to water, so they are not suited for outdoor use. The final product, therefore, usually requires a full-area transparent coating.

1.2. Long-term phosphorescent safety signage

These products must feature a longer afterglow period in order to comply with DIN 67510, part 4, whereby the substrates used, the printing inks and parameters must meet the DIN specifications, and the actual duration of the afterglow must be individually verified by the manufacturer of the safety signs.

2.0 Mara® Glow GW

Marabu offers the following solvent-based standard products:

→ Short afterglow

Mara® Glow GW 361 – greenish color

Perfect for eye-catching effects on stickers or signs for e. g. advertisement purposes.

→ Long afterglow

Mara® Glow GW 760 – whitish color

High pigment quality that is suited for the production of warning signs according to DIN 67510, if processed correctly and with a sufficient ink layer thickness. Pigments must be charged completely, e. g. with a xenon light at 1000 lux for 20 min.

For other substrates (e. g. glass or metal) and/or desired hues (whitish or greenish), this effect can also be offered in other ink systems (UV-curable or 2K solvent-based) upon request.

3.0 Properties & processing

Both phosphorescent inks are manufactured without the use of phosphor, lead-containing compounds, and radioactive materials.

Screen printing

The basis of the long-term phosphorescent ink is an extremely hard pigment with a very high specific gravity as well as the high pigment content. The ink, therefore, must regularly be stirred homogeneously before printing and during production. The pigment content in the printed ink layer will otherwise be reduced and the phosphorescent duration required by DIN 67510 will not be met. Due to the hard pigment quality, the stencil abrasion during production is quite significant. We recommend that the emulsion is only applied to the print side of the screen, and a hard squeegee with rounded edges is used.

Mesh count recommendation & mileage

GW 361: mesh 27-55 to 48-55 / approx. 8 m²

GW 760: mesh 27-120 / approx. 8 m²

These values relate to 1 kg of printing ink plus addition of 5 % thinner and depend largely on the stencil thickness and the roundness of the squeegee edge.

Pad printing suitability

The color shade Mara® Glow GW 760 also features limited suitability for pad printing. We recommend using a thick steel plate (10 mm) with an etch depth of 25-30 µm. Phosphorescent pigments are very hard and therefore have a very strong abrasive effect on the cliché, doctor blade, and ink cup. Common photopolymer clichés do not resist this strong abrasion and become unusable after a few prints.

Opacity

To achieve a maximum phosphorescent effect, Mara® Glow GW should only be printed onto white substrates due to the low opacity of the ink.

Light storage saturation

Both ink qualities produce a maximum storage when illuminated with 380-400 nm, wavelengths present in both daylight and neon light. If only incandescent lighting is available, even prolonged charging will result in only a reduced phosphorescent effect.

Critical points:

- Risk of curling edges can be decreased with thicker substrates.
- If the print is dried too fast and too warm, it may crack due to residual solvents

Phosphorescent duration

The phosphorescent quality **GW 361** produces, if fully charged and properly processed, a phosphorescent effect of approximately 30 min.

If properly processed, and provided that pigments are spread evenly, the long-term phosphorescent quality **GW 760** achieves and exceeds the values of DIN 67510 so that it glows for several hours: 20 mcd/m² after 10 min; 2.8 mcd/m² after 60 min; at least 0.3 mcd/m² after 340 min.

The abbreviation "mcd" stands for "millicandelas". It is the unit of luminance and is an indicator of the brightness of a light source or any luminescent object depending on the viewing angle. 1 cd (or 1000 mcd) corresponds approximately to the brightness of a candle.

4.0 Protective varnish & further processing

We recommend a protective overcoat with a suitable varnish as an additional protection against humidity:

- Either the solvent-based varnish **Libra Print LIP 910** or the UV-curable **Ultra Graph UVAR** and **Ultra Pack UVC** varnishes.
- For varnishing, we recommend the use of a mesh count similar or finer than the mesh used for printing.
- If above-average adhesion and resistance are required, the addition of hardener H 1 may be helpful. Preliminary trials are necessary.
- Owing to the high amount of pigments and their nature, the ink film generally tends to be rather brittle. For post-processing steps like cutting, stamping, folding, or grooving it is necessary to make sure that the ink film has completely dried. Preliminary trials are also essential here.
- Especially thin substrates must be tested first if they show any signs of curling edges after printing.

5.0 Remarks

The individual conditions (stencil, mesh, drying, post-processing, etc.) must be considered, tested and approved prior to production.

Contact

In the event of any queries, please contact:

Technical Hotline

Phone: +49 7141 691140

technical.hotline@marabu.com