Tech
INFO

Marabu

Glow-in-the-dark inks

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

Photoluminescent, so-called "glow-in-the-dark" products contain inorganic phosphorescent pigments. When the printed ink film is exposed to artificial light or daylight, these pigments can store the energy supplied (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 on this principle and make warning signs glow in the dark.

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 effect.
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.

Content

1. Long-term phosporescent safety signage

To produce long-afterglow products in accordance with DIN 67510, Part 4, the substrates, inks, and printing parameters used must comply with the requirements of the standard, and the actual afterglow duration must be individually verified by the manufacturer of the safety signs.

2. Mara® Glow GW 760

High-quality pigment with a whitish color. When properly processed and with sufficient ink layer thickness, it is suitable for the production of long-afterglow warning and information signs in accordance with DIN 67510, part 4. Pigments must be charged completely, e. g. with a xenon light at 1000 lux for 20 min.
Depending on the substrate (e. g. glass, metal), this effect can also be offered in other ink systems (UV-curable or 2-component solvent-based) upon request.

3. Properties / Processing

Mara® Glow GW 760 is manufactured without the use of phosphors, lead-containing compounds, or radioactive materials.

Screen printing

The basis of the afterglow inks is a very hard pigment with a very high specific gravity and a high pigment content. Therefore, the ink must be stirred homogeneously before printing begins and regularly during production. The pigment content in the printed ink layer will otherwise be reduced as the heavy pigments settle at the bottom of the container, thereby failing to achieve the required afterglow duration according to DIN 67510.

Mesh recommendation and coverage

Mesh **27-120 / approx. 8 m²**

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These values refer to 1 kg of printing ink plus addition of 5 % thinner and are highly dependent on the stencil thickness as well as the roundness of the squeegee edge.
Due to the hard and coarse pigment quality, stencil abrasion on the squeegee side is significant during continuous printing. Therefore, we recommend applying the emulsion only to the print side during stencil production and the use of a hard squeegee rubber with rounded edges.

Processing in pad printing
Mara® Glow GW 760 is also suitable for use in pad printing under certain conditions. Here, we recommend using a thick steel plate (10 mm) with an etching 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 are destroyed after just a few prints.

Opacity
For maximum afterglow, Mara® Glow GW should only be printed onto white substrates due to the low opacity of the ink.

Saturation charging
Mara® Glow GW 760 reaches its maximum storage at wavelengths of 380–400 nm, as found in daylight and neon light. If only incandescent light is available for charging, even prolonged charging will result in only a reduced phosphorescent effect.

Critical points:
- Possible tendency of the substrate to curl after printing (use thicker materials in this case).
- Cracking appears on the printed surface after a few days if the ink was dried too quickly and at high temperatures, causing residual solvents to become trapped in the lower ink layers.

Phosphorescent duration
If properly processed, and provided that pigments are spread evenly, Mara® Glow 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 "millicandela." 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. Protective varnish / Further processing
To protect against moisture, we recommend a suitable protective coating:
- In the solvent-based range, use the printing varnish **LIP 910** from the **Libra Print LIP** ink system**.**
- For UV-curable ink systems**,** the printing varnishes from the **Ultra Graph UVAR** and **Ultra Pack UVC** ink systems are particularly suitable**.**
- For overcoating, we recommend using the same mesh count as for printing or finer.
- For particularly high requirements regarding adhesion and durability, the addition of hardener H 1 can have a positive effect. Preliminary tests are necessary.
- During further processing, note that the printed ink film tends to be hard and brittle due to its high pigment content. If the printed ink film is subsequently cut, die-cut, folded, or grooved, it must be thoroughly dry. Preliminary tests are also essential here.
- Especially thin substrates must be tested first if they show any signs of curling edges after printing.

5. Notes
The specifications and recommendations must be individually verified and approved prior to production under the respective conditions (stencil, mesh, drying, further processing, etc.).

Contact
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