

## Printed Lightsource for Safety and Promotion



*With the newly developed special screen printing inks from Printcolor you can utilise the entire spectrum of phosphorescent effects easily and in a high quality. If long afterglow safety signs are still a task for experts this special effect group provides large potential for all those printers involved in the various segments of novelty, industrial graphic and print finishing.*

### **What are phosphorescent inks**

Phosphorescent or afterglow colors belong to the large effect group of luminescent systems. They are entirely free of any radio activity. The after glow effect is a pure physical process. Similar to a battery the phosphorescent crystals are loaded up by the surrounding light and release the stored energy in the form of visible light over a period of time after the light source has been turned off. Because this is a physical process the effect of loading and emission is repeatable as often as lifetime of decorated product.

### **How do they work**

Printcolor afterglow colors contain phosphorescent, inorganic crystalline pigments. The crystal core in these pigments is doped with foreign atoms. These foreign atoms serve as excitation-, storage- and emission centres. The excitation occurs with natural light or most artificial light sources like neon lamp or halogen light. After sufficient excitation with a suitable light source electrons are brought up to a higher energy level and release the energy difference in form of visible light. After the excitation has stopped initially a lot of electrons fall back to their unexcited stage and the light emitting is therefore very strong. In further of time the number of excited electrons become significantly less and the intensity of afterglow lowers down to the zero point.

### **Which factors decide the afterglow time**

The total afterglow time and intensity of phosphorescent colors depend first of all on the pigment quality. The second important factor is the mass (number) of light crystals which depends obviously on the ink deposit on the substrate. Usually afterglow colors are printed with fairly coarse PET-meshes in the range of 34 to 77 threads per centimetre. All Printcolor phosphorescent inks are pigmented up to the highest possible level. The final relevant factors are the intensity and type of light source which is used to load up the phosphorescent ink.

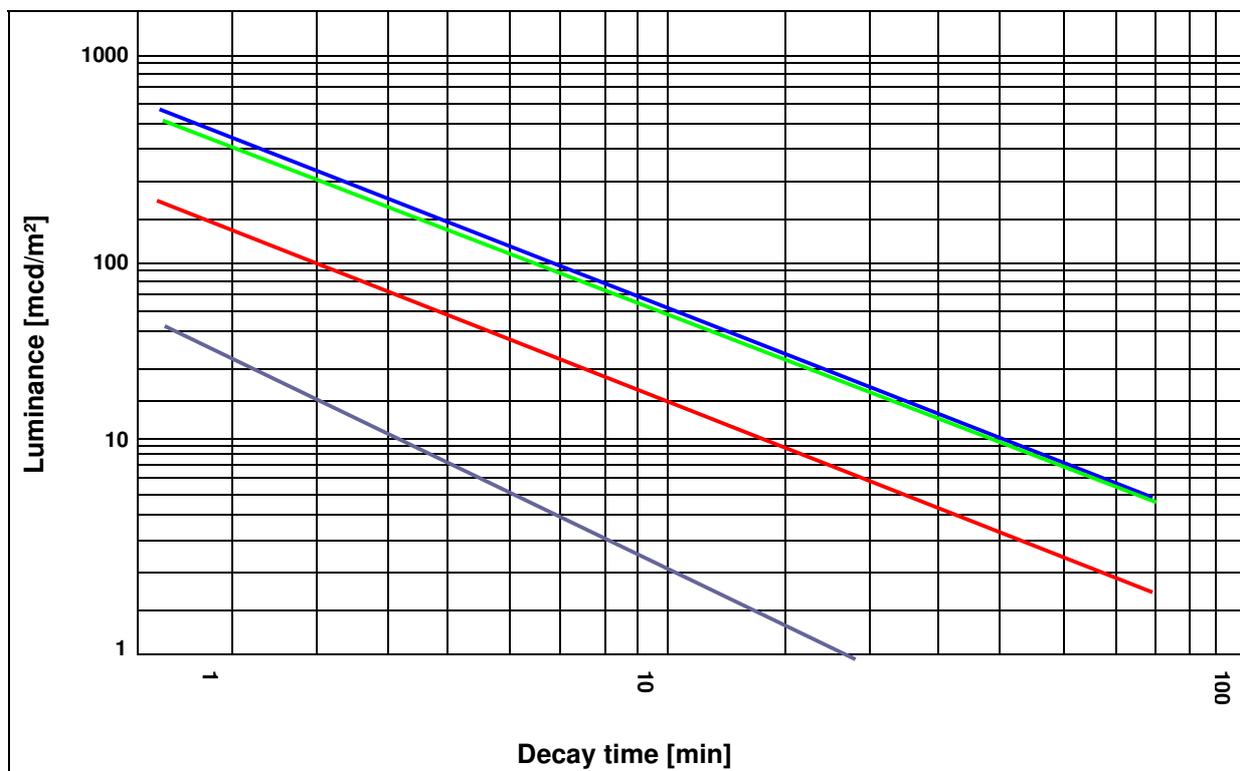
### Which light sources are suitable to load up the ink

Basically all ultraviolet-, daylight- and artificial light sources with a high energy output are suitable. Exceptions are the yellow emission type sodium vapour lamps and any red light. As stronger the intensity of the light sources as brighter the afterglow effect.

### How is the afterglow strength measured

For characterisation of the afterglow properties the phosphorescent pigments or ink films are measured in a test set up according to DIN 67510 with regard to brightness and decay time. In the following picture you find two comparative graphs of the decay curves of an PEQ (Economy quality) and PHQ version (Security quality) in a half logarithmic scale.

#### Measurement according to DIN 67510, Part 1



	<b>DIN 67510, part 4</b>	<b>100/20/2.8-340-W-K/DIN 67510-1</b>
	<b>Series xxx-PHQ49/00</b>	<b>317.5/69.3/8-840-W-K/DIN 67510-1</b>
	<b>Series xxx-PHQ47/00</b>	<b>315.4/62.8/8-1028-W-K/DIN 67510-1</b>
	<b>Series xxx-PEQ47/00</b>	<b>22.4/2.4/0-41-W-K/DIN 67510-1</b>

Because of the variables which derive from the screen print technology this values are only examples. The declining brightness can from an individual borderline only be seen when eyes are adapted to total darkness first.

### Which versions and colors are in our range

Principally Printcolor offers two versions of afterglow systems. The version PHQ has an afterglow time of a couple of hours (depending on the film weight) and fulfil the demands of DIN 67510, part 4 (*Products for long-term security lead systems, markings and signs*), thus also signalisation for emergency exits. As a less cost alternative in particular for promotional applications there is an PEQ version in the range. As standards all afterglow colors are available in Series 560, a fast curing UV ink with a wide adhesion range and in Series 320 the solvent based counterpart. Phosphorescent colors with customised characteristics can be formulated in virtually all of our ink ranges on special request.

The following table lists all currently available PHQ and PEQ versions by body- and phosphorescent color.

#### Standard versions of phosphorescent inks

<b>Economy quality</b>	<b>Luminescent</b>	<b>Day light optic</b>
Series 320-PEQ47/00	Green	White, light green
Series 560-PEQ47/00	Green	White, light green
<b>Security quality</b>	<b>Luminescent</b>	<b>Day light optic</b>
Series 320-PHQ47/00	Green	White
Series 320-PHQ49/00	Blue	White
Series 560-PHQ47/00	Green	White
Series 560-PHQ49/00	Blue	White

### Phosphorescent and fluorescent combinations

As the latest development from Printcolor we have the particularly attractive combination of phosphorescent and fluorescent colors. Utilising new technology we have become able to formulate afterglow inks in a very wide range of daylight colors. With a bright and consistent bluish afterglow in the dark the new system shows intense fluorescent colors under day light condition. Additionally realized are neutral colors for example grey with an intensive glow in the dark optic of blue or green.

#### Special versions of colored phosphorescent inks / Examples

<b>Economy quality</b>	<b>Luminescent</b>	<b>Day light optic</b>
Series 320-PEQ40/40	Yellow	Neon yellow
Series 320-PEQ43/00	Red	White
Series 320-PEQ49/33	Blue	Grey
<b>Security quality</b>	<b>Luminescent</b>	<b>Day light optic</b>
Series 320-PHQ44/44	Red	Neon red
Series 388-PHQ46/46	Magenta	Neon cyclamen
Series 560-PHQ47/29	Green	Green
Series 560-PHQ49/27	Blue	Blue

### **Offset and screen printing combination**

Another sensational development addresses the combination of screen printed afterglow colors which act the same time as an adhesion primer for offset inks. In this formulation we combine a very fine grade of phosphorescent pigments with a micro-porous binder system. If printed through a 90 threads per centimetre mesh a very smooth and receptive coating develops which is ideally suited to be overprinted with offset inks. The primer ensures good anchoring of the offset ink and a stable water balance.

### **Wide range of application**

In particular the use of long afterglow systems from Printcolor opens a wide window of interesting potential applications. Emergency signs, door handles, light switches, user panels, automotive parts, instrument marking and guide systems. But also applications in the fun-, outdoor- and sports markets still wait to be discovered. In the segment of print finishing you can hardly find a product which would not benefit from an additional afterglow effect. If the light goes out your message appears.



### **Phosphorescent inks can save life**

The application of extra long after glowing screen printing inks makes it possible to equip rooms or areas of danger with highly visible markings. These markings allow people in danger to clearly see the way to escape when all other lighting systems have failed. The construction and minimum requirements for such escape and emergency systems are described in DIN 67510, part 1 to part 4. Printcolor offers many products which can meet or supersede these specifications when printed accordingly.



**If you are now interested to look at the many opportunities and how our products might help just contact your local Printcolor representation to get more information and advise of how to obtain an ink sample against a partly refund of cost.**