

## LightingEurope Position Paper

### Do photo-luminescent exit signs offer sufficient safety during power failures?

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#### **What are photo-luminescent exit signs and how do they work?**

“Glow in the dark” materials are materials that absorb energy and release that energy slowly in the form of visible light at a low light level. Due to this low light level they are normally only visible in the dark. The process is called phosphorescence and in the case of photo-luminescent exit signs the phosphorescent material is “charged” by exposure to light. This creates an excess of energy in the material that is released as light. Materials used for photo-luminescent signs are chosen (or developed) in such a way that the energy is released slowly, much slower than in the phosphors used in common fluorescent tubes or in LEDs.

#### **Which standards apply?**

The application standard for emergency escape lighting and exit signs is the EN 1838.

In the most recent revision of the standard dated 2013, the following statement is made: “It is important to assure, that under emergency lighting conditions the sign shall be sufficiently illuminated to be visible and the safety colour green stays green and the contrast colour white stays white within the colour boundaries specified in ISO 3864-4.”



Internally illuminated exit sign



Photo-luminescent exit sign

A photo-luminescent exit sign measured in the dark would not meet the luminance requirements of EN 1838 (§5.4 Luminance of safety signs). The pictograms and the background colours are out of range compared to the spectrum indicated in the standard (§5.4.4). Moreover, during a power failure the minimum luminance of 2 cd/m<sup>2</sup> in the green colour is never reached (§5.4.1). In addition, the luminance decay of photo-luminescent exit signs means that the typical luminance output after 10 minutes is approximately 20% of the output after 2 minutes, when the minimum light level to the norm is required for a minimum of 1 hour (§5.4.5). The contrast between the white and green color part is larger than the maximum allowed ratio of 15:1 (§5.4.3). These are all values which compromise good recognition of the signs in an emergency situation and reduce safety when evacuating a building.

### **Time dependent decay of the phosphorescent**

A photo-luminescent sign needs enough illumination over a sufficiently long time period to be fully charged, in order to be able to provide the appropriate illuminance during a failure in the electrical supply.

High amounts of light are needed to charge the photo-luminescent material, which may not always be available when low ambient or soft lighting is in operation. The charging of photo-luminescent material is also dependent upon the time the material is exposed to external (mains) lighting. This duration can be very short if presence/absence detectors have been installed for energy saving reasons.

EN 1838 also states that “To ensure that emergency escape lighting operates when it is required to meet legal requirements, it shall be installed, tested and maintained in accordance with IEC EN 60598-2-22, EN 50172 and IEC EN 62034 (if automatic test facilities are installed)”. The European Standard EN 50172 specifies the provision and illumination of escape routes and safety signs in the event of failure of the normal supply, and specifies the minimum provision of such emergency lighting based on the size, type and usage of the premises. This standard relates to the provision of electrical emergency escape lighting and therefore by definition, photo-luminescent exit signs do not comply with this standard.

The product safety standard for emergency lighting products is IEC EN 60598-2-22. Because this standard is developed for electrical products, photo-luminescent exit signs cannot be tested according to this standard.

### **Conclusions**

Signs of the photo-luminescent type, i.e. where the active material making up the luminous parts of such signs needs a period of exposure to light before they become visible in darkness do not provide adequate safety conditions. They cannot be used as an alternative to internally or externally illuminated escape route signs and are not a substitute for appropriate emergency lighting.