SAMCON
Prozessleittechnik GmbH

Project planning criteria for Ex-protected lights

(Determination if a light capacity has to be evaluated according to EN 60079-28)

Title:	Project planning criteria for ex protected lights
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Revision history

Rev.- Index	Date	Name	Comment
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1 Problem description

SAMCON are a manufacturer of camera systems for hazardous areas, not only offering a wide variety of explosion proof CCTV cameras but also project planning and project support. Many times, the use of lighting technology is required; the spectrum of lights ranges from explosion proof lights for sight glass applications to linear luminaires Xenon lights.

As optical radiation is potentially able to ignite explosive media, the Norm EN/DIN 60079-28 describes the minimum requirements for devices and transmission units which emit optical radiation.

Currently, not all lights which are available on the market are certified in accordance with this standard.

In addition, not all manufacturers of explosion proof lights provide the same answer to the question if lights have to be evaluated according to this standard 60079-28. As a result, those setting the standards have reacted by publishing a complementary interpretation sheet (DIN EN 60079-28 interpretation sheet 1:2014-09).

On the basis of the interpretation sheet, the document's objective is to support project planners with the evaluation process by finding out whether an Ex-light has to be assessed according to 60079-28.

In chapter 3, the interpretation sheet of March 2014 will be evaluated in greater detail.

2 Objective of this document

On the basis of the interpretation sheet, the document's objective is to support project planners with the evaluation process by finding out whether an Ex-light has to be assessed according to 60079-28.

Please note that even despite thorough research, it is not possible to exclude errors; the document neither claims completeness nor 100% accuracy.

3 DIN EN 60079-28 interpretation sheet 1:2014-09

*„ …*Does the scope of this standard cover*:*

1) *non-array divergent LEDs;*
2) *luminaires;*
3) *optical radiation sources for Mb, Gb or Gc applications which comply with Class 1 limits optical radiation sources for Mb, Gb or Gc applications which comply with Class 1 limits*
4) *single or multiple optical fibre cables not part of optical fibre equipment; or*
5) *enclosed equipment involving an enclosure that fully contains the optical radiation and that complies with a suitable type of protection?"*

*„..*This standard applies to optical fibre equipment and optical equipment, including LED and laser equipment, with the exception of the equipment detailed below:

1) Non-array divergent LEDs used for example to show equipment status or backlight function

2) All luminaires (fixed, portable or transportable), hand lights and caplights (other than for Group I) intended to be supplied by mains (with or without galvanic isolation) or powered by batteries

   - with continuous divergent light sources (for all EPLs);
   - with LED light sources (for EPL Gc only).

3) Optical radiation sources for Mb, Gb or Gc applications which comply with Class 1 limits in accordance with IEC 60825-1.

4) Single or multiple optical fibre cables not part of optical fibre equipment if the cables

   - comply with the relevant industrial standards, along with additional protective means e.g. robust cabling, conduit or raceway (for Gb, Mb or Gc);
   - comply with the relevant industrial standards (for Gc).

5) Enclosed equipment involving an enclosure that fully contains the optical radiation and that complies with a suitable type of protection as required by the involved EPL, with the enclosure complying with one of the following conditions:

   - an enclosure for which an ignition due to optical radiation in combination with absorbers inside the enclosure would be acceptable (such as flameproof "d" enclosures), or
   - an enclosure for which protection regarding ingress of an explosive atmosphere is provided, such as pressurized "p" enclosures, restricted breathing “nR” enclosure", or
   - an enclosure for which protection regarding ingress of absorbers is provided (such as 6X enclosures) and where no internal absorbers are to be expected.

NOTE For these scope exclusions it is anticipated that the enclosures are not opened in the explosive atmosphere, so that ingress is protected…“

4 Schematic interpretation

When does a light source emitting light into the hazardous area have to be evaluated according to 60079-28 (does not concern laser! (see below))?

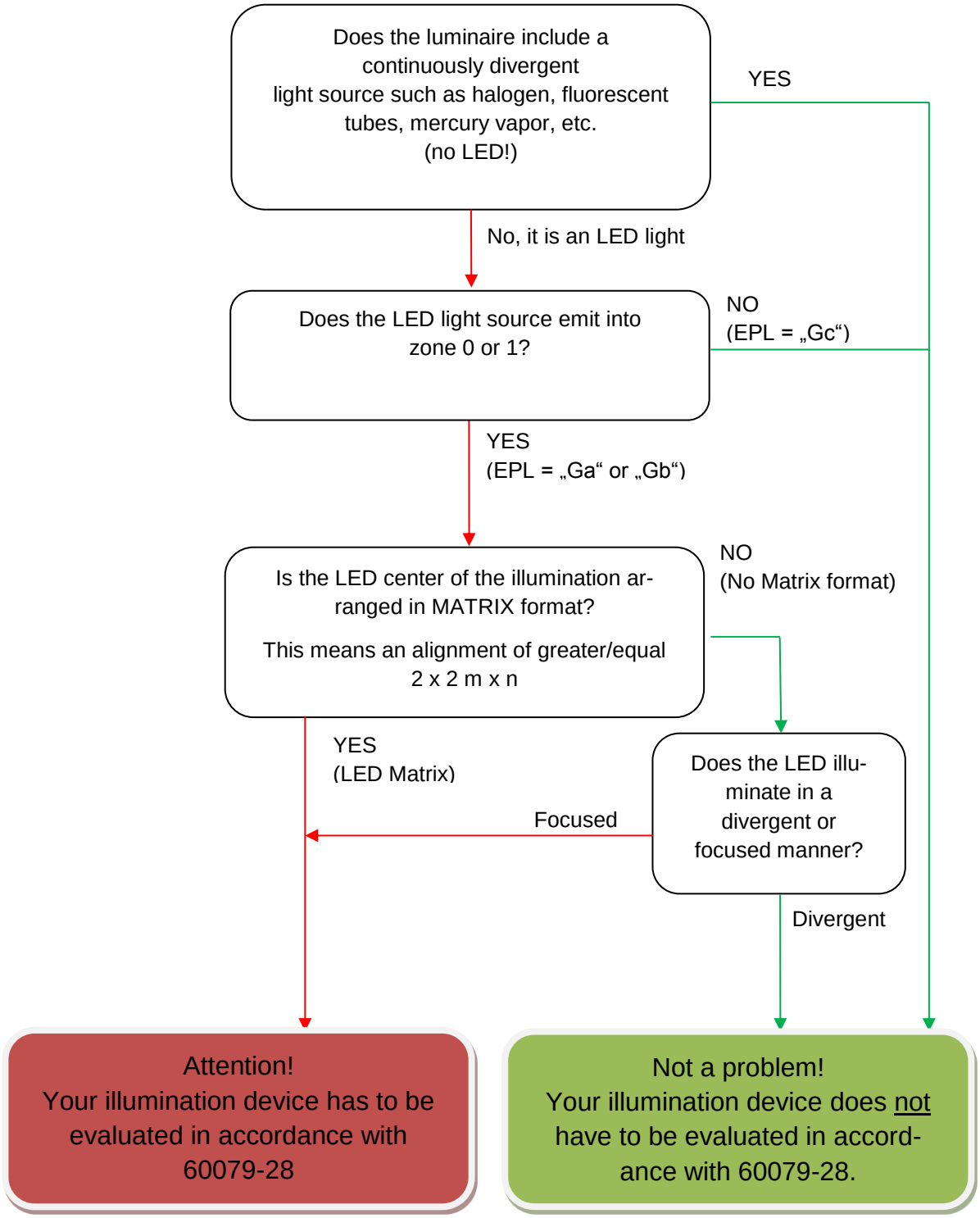


Figure 3-1 Evaluation scheme for ex illumination

5 Comments and conclusion

5.1 Unapplied answers

Answer 3 of the interpretation sheet refers to LASER devices which are not considered when evaluating illumination technology.

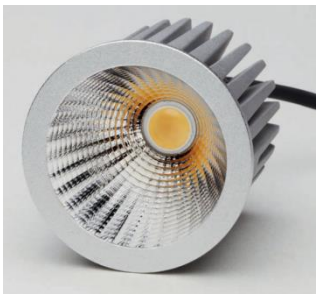
Answer 4 of the interpretation paper sheet refers to closed cable and lines which are not considered when evaluating illumination technology.

Answer 5 of the interpretation sheet refers to opaque and closed enclosures. Enclosures used for headlights are always translucent as otherwise it remains dark. Answer 5 will not be considered when evaluating illumination technology.

5.2 Matrix LEDs

Matrix LEDs have an m x n alignment, whereas n> = 2 and m> = 2.

Picture 4-1 Headlight with LED Matrix



Picture 4-2 Single LED headlight

5.3 Divergent or focused

Within the ex-area as well as outside the enclosure, no combustion point shall be created. Due to this, the LED light should be divergent.

Generally it can be assumed that a greater exit angle of the light results into a more divergent illumination. The more divergent the light, the more the light energy decreases with distance to the illumination source.

For systems with a reflector it is possible that a combustion point maybe created in front of the reflector. If such a combustion point is evident, it has to be within the protection system.

In the field, the divergence degree of an illumination source as well as the existence of a combustion point can easily be tested with a white sheet of paper:

Figure 4-3 Single LED headlight

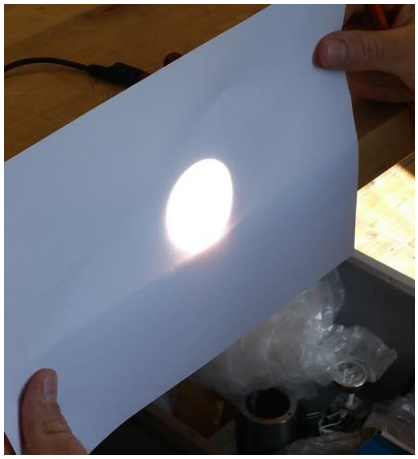


Figure 4-3 A sheet of paper in front of a single LED headlight

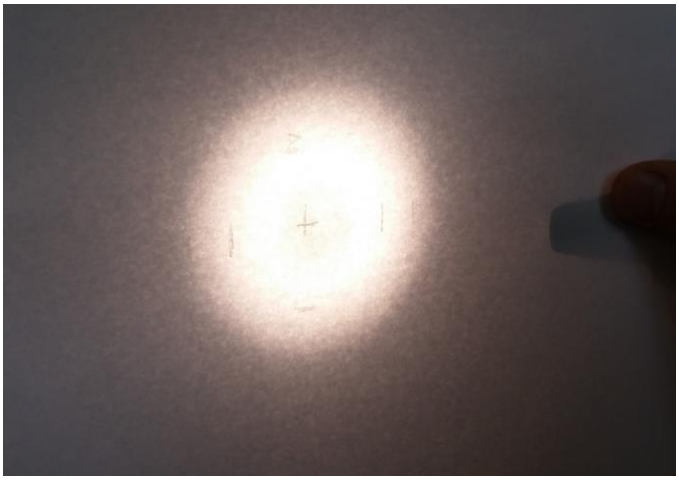


Figure 4-3 A sheet of paper in front of a single LED headlight (distance of 20 cm)

When slowly moving the sheet away from the light source, the light is divergent if the following two parameters are met:

1. The diameter of the light beam continuously increases
2. No light points (combustion points) are visible

For flashlights, for example, it is often possible to adjust the reflector in order to get a focused light.

Laser pointers also generally emit homogenous focused light.

Attention!
The „paper test“ only serves illustration purposes and is not a scientific test. To be sure, please inquire with the manufacturer if the light is „divergent“ or „focused“.

6 Conclusion

The interpretation sheet is a useful tool for manufacturers of explosion proof illumination technology.

Regarding divergently emitting LEDs, though, there is still some room for interpretation (question and answer 1) as this paragraph can be interpreted in such a way that divergently emitting LEDs do not have to be evaluated, regardless of their application (q.v. scheme).

For LEDs, the PTB distinguishes whether the LED is used as a light, or if it serves the purpose of displaying an equipment status or if it is a background illumination for LCD displays. Hence, The PTB generally evaluates LEDs on the basis of the EN 60079-28.

We hope to have answered at least a few questions with this brief document.

In case you have noticed any faulty infomation in this document or that you have some suggestions, we are happy to receive your feedback at info@samcon.eu