

# **COSINE DEVELOPMENTS**

Reg. No. IT 1637/97

**//LEADERS IN LIGHTING TECHNOLOGY//**

**P O Box 10177  
Marine Parade  
4056**

**Tel. : +27 (31) 5793090/4  
Int. Fax. : +27 (31) 5793021  
Local Fax. : (031) 5793021**

**24 Ashfield Avenue  
Springfield Park  
Durban**

## **Emergency lighting: A summary of requirements**

*By: S. Marais*

### **The Occupational Health and Safety Act (OHS) 85 of 1993**

This act stipulates that every employer shall provide emergency lighting any workplace where no natural light is present for safe evacuation. Employees therefore need just sufficient light, aptly described elsewhere as “orientation lighting”, in order to safely evacuate the premises. A minimum required illuminance of 0.3 lux measured at floor level can be realised with surprisingly few strategically placed emergency luminaires.

An additional requirement is for emergency illuminance of not less than 20 lux over moving machinery, where dangerous materials are present or where processes need to be shut down. These regions therefore require “high-risk task area emergency lighting”.

The Act requires that the emergency lighting must last long enough for safe evacuation. This is very vague but the employer should be covered by using either the industry standard one hour duration units for most applications or the three hour duration systems for high rise buildings, covered parking areas and lift cars.

The employer must also keep the emergency lighting system in good working order and it must be tested at least every three months. This requirement will force a major change in current practice: emergency lighting systems are usually installed and forgotten. This sad custom is blatantly obvious even when there are power failures in hospitals, power reticulation centres and in other key areas: inevitably few of the emergency luminaires actually work. With the onus now shifted onto the employer it is important that the emergency luminaires are SABS approved so that battery identification and replacement can proceed without the need to consult the original, now maybe long gone, lighting supplier. It is also important that the battery packs are easy to replace without the assistance of double sided tape.

Interestingly the Act tacitly disapproves of using directional emergency luminaires for escape

routes by imposing strict glare restrictions. It is therefore not suitable to position one bright, directional emergency luminaire at one end of a passage.

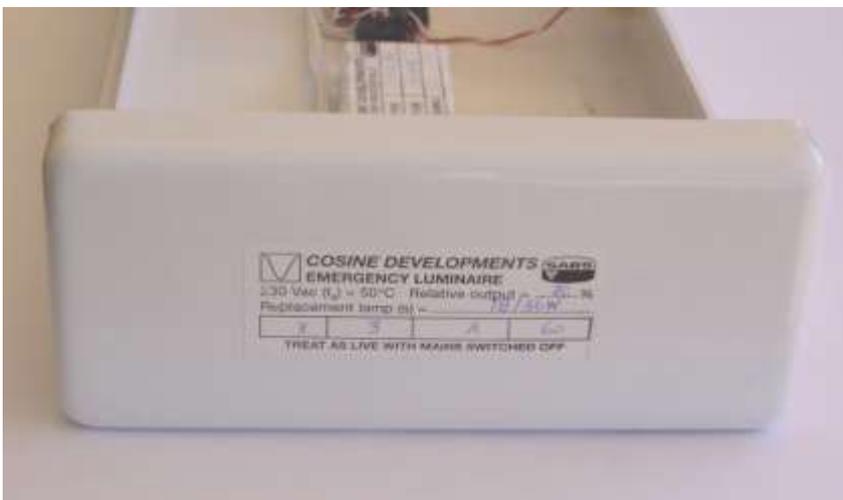
## SANS 1464 Part 22: Luminaires for emergency lighting

This specification details the minimum performance of the emergency lighting system. It is worth noting that emergency lighting required by the OHS Act must comply with this performance requirement. The specification attempts to prescribe a minimum level of safety, reliability and maintainability in order to benefit the end user and protect the public. It calls for:

- specific marking, construction and safety requirements,
- compliance to an endurance test,
- measured photometric performance,
- high ambient temperature operation (70°C) and
- specific battery charging and discharging regimes.

The high ambient temperature operation and battery charge and discharge requirements warrant careful consideration. Firstly, the high temperature operation rules out the use of sealed lead-acid batteries in self contained luminaires because elevated temperatures will result in early battery failure. Lead-acid batteries are considerably cheaper than nickel-cadmium types but their service life is dramatically reduced at high temperatures. Secondly, only high temperature nickel-cadmium cells should be used in self contained emergency luminaires. Thirdly, it is not possible to interchange lead-acid batteries with nickel-cadmium types because of different charging and low voltage cut-off requirements.

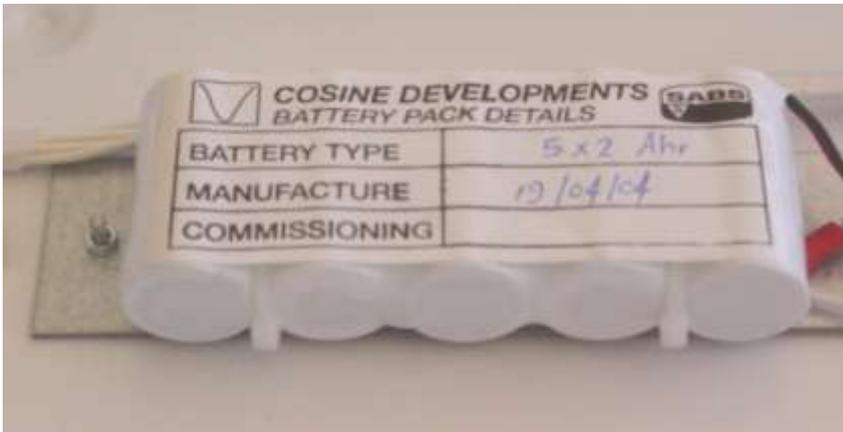
The highly technical nature of this document renders it virtually unreadable to many, however, there are many visible identifiers that suggest conformance of any chosen luminaire.



**Figure 1**

Emergency luminaires must be classified and marked (as shown in figure 1). This label “must be positioned in a conspicuous position”. The word conspicuous may be interpreted as

being visible before the luminaire is installed or before the diffuser is fitted. It is, however, in the owners interest that the label is visible at all times so that identification during testing is simplified. It should therefore be located on the outside of surface decorative and channel units and adjacent to (on the ceiling) a recessed or down-light fitting. The label identifies that it is an emergency luminaire, is SABS 1464-22 compliant, maximum ambient temperature, rated emergency light output, whether it is self contained (internal battery) or has a central supply, its mode of operation (non-maintained, maintained, combined, etc.), what facilities such as test devices it includes, and its emergency duration in minutes.



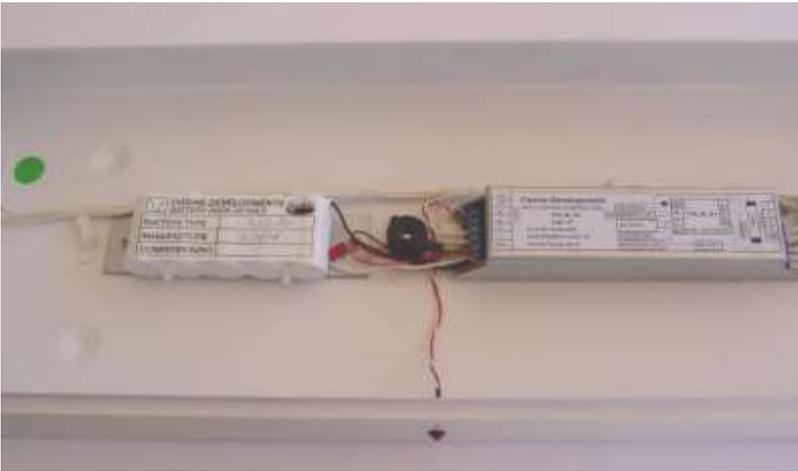
**Figure 2**

The battery pack must have a label indicating battery, manufacture and commissioning dates (Figure 2). These details are important because all batteries have a finite service life and need to be replaced. The manufacture and commissioning dates will assist maintenance by indicating actual service life. It is generally accepted that the batteries used in emergency luminaires (high temperature nickel-cadmium) will have a useful service life of three years before the emergency lighting duration falls below the specified minimum.



**Figure 3**

In combined luminaires the emergency lamp must be identified by a green dot (Figure 3). This requirement also has been introduced to assist maintenance.



**Figure 4**

The electrical and safety requirements of SANS 598-1 must apply. In other words the creepage distances and clearances must be sufficient on both mains and lamp wiring. Figure 4 shows a neatly wired emergency luminaire in accordance with SANS 598-1. The charging indicator light must be visible after the diffuser has been fitted. This is easily achieved with surface decorative or open channel luminaires but is more difficult with recessed fittings and down-lights. Note also that the batteries are nowhere near the ballast or other heat sources as their service life is adversely affected by heat. The current practice of shoe horning emergency gear into bulkhead type luminaires should be avoided because of excessive heat build up within the fitting. Evidence suggests that batteries would require replacement once a year in maintained bulkhead fittings.

## **SANS 10114: Interior lighting. Part 2: Emergency lighting**

This specification provides guidelines for the implementation of emergency lighting systems. At present no reference is made to this specification in law but this is sure to change. Clear distinction is made between standby lighting and emergency escape lighting. Standby lighting is non-mandatory and is described as that part of emergency lighting to enable normal activities to continue substantially unchanged whereas emergency escape lighting is that emergency lighting required by OHS act 85 of 1993. Our regulations now fall into line with international norms where only low emergency light outputs, of the order of 20%, are required thereby reducing system cost. Emergency escape lighting can therefore be aptly describes as orientation lighting: basically all that is required is sufficient emergency light for personnel to see obstacles and evacuate the premises.

Besides suggesting that emergency lighting be situated along the escape route there should also be luminaires positioned above safety signs, near each first aid post and near each piece of fire fighting equipment. The colour rendering requirement of at least 40 precludes the use of single colour LED systems. Fluorescent lamps are usually used for escape routes

due to their high lumen efficacy and their good colour rendering at low powers.

Of special interest is the requirement that the emergency lighting should be activated in the case of localized failure where such a failure would present a hazard. The use of backup generators should therefore be used judiciously.

A maximum uniformity ratio of 40:1 is suggested for escape route lighting. This is the ratio maximum to minimum illuminance at floor level indicating that it is advisable to have more low output luminaires than few high light output units along the route.

A maximum response time of 15 seconds and a minimum duration of one hour is suggested. It should be noted that the minimum duration should be achieved throughout the battery service life and so the initial commissioning duration should exceed the stated duration by at least 30%.

For high-risk task area lighting the minimum illumination level of 10% of the normal lighting level of 20 lux is suggested. A response time of 0.5 seconds may call for specially designed lighting equipment. Both halogen and fluorescent emergency lighting are used for this task.

Three hours of emergency lighting is suggested for lift cars, for any building higher than 10 storeys and for shopping malls.

The specification calls for drawings of emergency lighting installations to be retained on the premises as well as a log book containing date of commissioning, date of each inspection and test, defects and remedial action, alterations and tests of duration.

## References

- *Occupational Health and Safety Act 85 of 1993*. Lex Patria Publishers
- *SANS 1464-22 Safety of luminaires. Part 22: Luminaires for emergency lighting*. The South African Bureau of Standards.
- *SANS 10114-2 Interior lighting. Part 2: Emergency lighting*. The South African Bureau of Standards.
- Marais, S. "Standby lighting: a state of emergency?" *Elektron Journal*. June 1998.