Load-sensing Emergency Lamps
Do they satisfy legal requirements?

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1. General

There have been a proliferation of load-sensing emergency light bulbs entering the emergency lighting market. These two-pin emergency bulbs function as normal lights when the mains power is switched on and off but can initiate emergency lighting function if they perceive that ESKOM has failed by sensing other equipment connected to the mains circuit. These two-pin emergency bulbs were tested by the author for performance and compliance to compulsory South African Specifications.

Two-pin emergency lamps have internal batteries and electronic circuitry to drive the illuminating LEDs, charge the battery and sense mains. They therefore provide normal lighting and charge their battery whilst the mains power is switched on. When the mains power is switched off, they impose a signal (either ac or dc) back onto the mains. If this signal detects no other load, then the LEDs are extinguished – so it merely operates like any other light source. However, if the signal detects another load, then the circuitry assumes that ESKOM power has failed, and the LEDs are then driven by the internal battery thereby providing emergency lighting.

There are problems with this technique:

- If the emergency bulb is connected to the same light switch as other light sources, then its emergency action may be initiated every time the light switch is turned off.
- The sensing signal can be fooled by certain loads.
- The internal battery only charges when the light switch is turned on.
- Sometimes two emergency bulbs on one light switch affect each other causing false emergency light initiation.
- The emergency bulb relies on other loads that may not be on the same circuit.

2. Compulsory Specifications

2.1. VC 8055 Electrical and Electronic Apparatus

Excerpts from the Standard:

'***1.1*** *This compulsory specification covers safety and energy saving requirements ...for use by ordinary citizens in household, light industrial and general office applications. Such apparatus is generally available through normal retail distribution channels*.'

*'**3.6** Luminaires shall comply with the relevant requirements of the appropriate of the following standards:*

c) Luminaires for emergency lighting shall comply with SANS 1464-22 Safety of luminaires, Part 22 Luminaires for emergency lighting. Or

e) Luminaires using LED as a light source shall comply with the following:

- *SANS 60598-2: Luminaire requirements and tests, and relevant part 2s or SANS 1464-22: luminaires for emergency lighting.'*

2.2. SANS 1464-22 Safety of luminaires Part 22: Luminaires for emergency lighting

Excerpts from this standard:

'22.3.6
Emergency mode
The state of a self-contained emergency luminaire that is energised by its internal power source, the normal supply having failed.'

Load-sensing emergency bulbs require additional supply loads to activate their emergency function. Their emergency function cannot be guaranteed with complete supply disconnection or with certain loads. For example, some resistance sensing bulbs cannot detect switch-mode power supplies as used in most LED luminaires hence they will not initiate emergency light mode.

If the emergency bulb function is reliant upon a load on a different circuit, then to satisfy fire safety requirements flame retardant cable should be used between the emergency bulb and the energising load.

‘***22.3.9***
Inhibiting mode
The state of a self-contained emergency lighting luminaire that is inhibited from operating by a remote device connected to the normal supply and that, in the case of a normal supply failure, does not change over to emergency mode.’

The inhibiting mode (no emergency function) for load-sensing emergency bulbs is dependent upon the other type of luminaires on the same lighting circuit. In some cases, the load-sensing bulbs may activate each other when the supply is switched off thereby initiating emergency mode when not required. In this case the battery will be depleted in the event of a power outage.

’22.5 Marking’

‘*22.5.2 Luminaires shall be clearly marked with their classification in accordance with 22.4 (see Annex C).*’

No such labelling was provided with the samples tested.

‘*22.5.8 Test facilities to simulate normal supply failure, where provided, shall be so clearly marked that the marking is visible during routine maintenance.’*

‘22.5.13 In the instruction leaflet supplied with the luminaire, the manufacturer shall give details of test facilities incorporated in the luminaire.’

The load-sensing bulb manufacturer should provide details of every type of load (other light fittings, fans, computers, appliances, etc) required to initiate emergency lighting.

‘22.5.15 In the instruction leaflet supplied with the luminaire, the manufacturer shall give details of the rated lumen light output.’

This important detail omitted by some manufacturers.

‘*22.12 Endurance and thermal test’*

‘22.12.1 In the case of self-contained emergency luminaires …
In addition, the luminaire shall operate … then disconnected for 20 seconds.’

‘22.17 Changeover operation’

‘22.17.2 Following complete battery discharge …
The supply to the luminaire is then disconnected within 0.5 seconds …

The luminaire supply is then switched off and on 500 times… After these cycles, the supply is again disconnected.'

These tests could not be performed on the samples tested because the load-sensing emergency bulbs require an additional mains load to initiate emergency function. SANS 1464:22 would have to be re-written to include 'Disconnect from mains and connect to a fan, toaster, incandescent lamp, transformer… but not an OSRAM ballast or a GU10 LED lamp or a … to initiate emergency function' to enable two-pin emergency lamps to comply.

3. Conclusion

Besides reservations of their suitability as reliable emergency light sources, load-sensing emergency light bulbs clearly do not conform to SANS 1464:22, are therefore not compliant with compulsory South African Standards and thus not fit for either domestic or industrial applications.