The Independent Fire Engineering & Distributors Association

Memo-Servicing & Technical Info

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Visual alarms : EN54-23

The recent publication of EN54-23, the new product standard for visual alarms, presents a challenge to the way in which these devices are made and installed.

The Disability Discrimination Act (DDA) makes service providers and employers responsible for ensuring that disabled people do not receive less favourable treatment than the able bodied. Since its introduction, the fire alarm industry has responded by providing detection systems that generate both audible and visual warnings when a fire is detected. Normally, a visual alarm is only used in a fire alarm system to reinforce a warning from the primary audible warning device such as a bell, siren or voice alarm but it is never the primary method of raising the alarm. However, in a building in which deaf and hard of hearing people are present, a risk assessment may indicate that a visual alarm will have to become as important as the normal audible alarm in attracting their attention. In such cases, the strobe units or beacons must produce a sufficiently high light output to achieve the objective.

A typical beacon installation in a factory

By definition, as a life safety industry, anything that improves the effectiveness of an automatic fire system is an advance to be welcomed, particularly if it provides enhanced protection for all occupants of the protected building. Until now, however, there has been no product standard specifying the performance requirements of visual alarm devices.

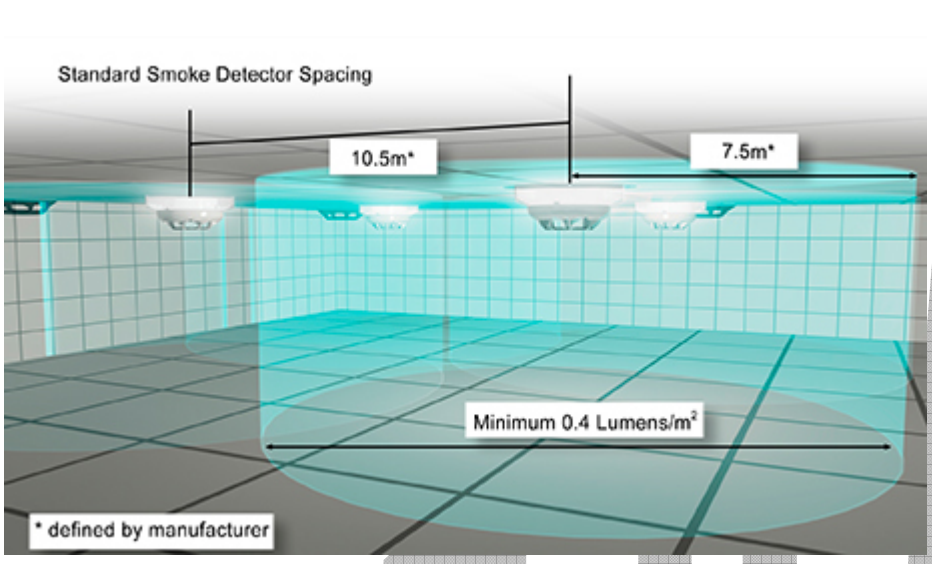
EN54-23

The product standard EN54-23: *Fire alarm devices – Visual alarms* defines the performance requirement of visual alarm devices and was published by BSI in June 2010. Typically, for fire detection and alarm product standards produced to satisfy the EU Construction Products Directive (Harmonised

Standards), there is a 36-month transition period from the time the standard becomes available to national standards bodies. At the end of this transition period products which do not satisfy the harmonised standard (indicated by a CE Mark), will no longer be able to be put on the European market. In the case of EN54-23, the date by which national conflicting standards must be withdrawn is March 2013.

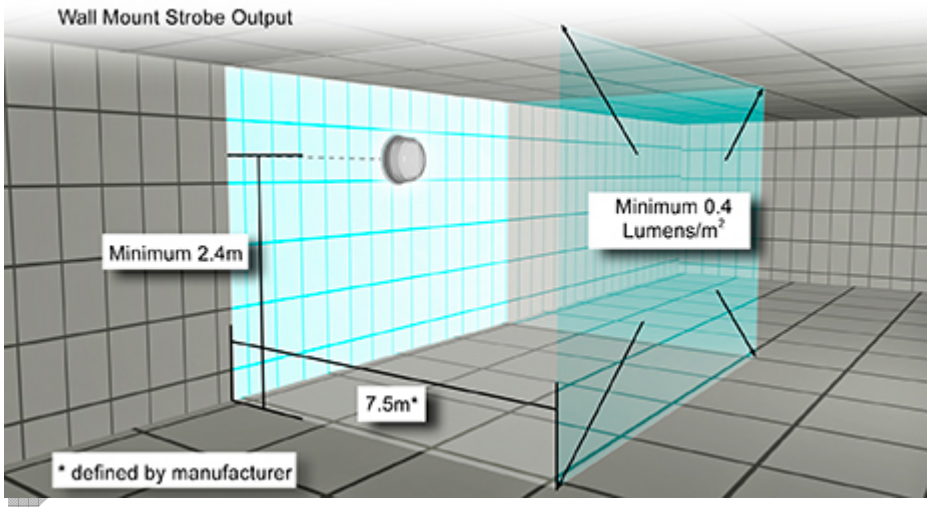
The standard specifies the requirements, test methods and performance criteria for visual alarm devices in a fixed installation, intended to signal a visual warning of a fire initiated by the fire detection and alarm system. It covers only those devices that derive their operating power by means of a physical electrical connection to an external source, such as a fire alarm system, and it applies only to pulsing or flashing visual alarm devices – for example Xenon or rotating beacons and devices that rely on software for their operation.

The introduction of a mandated harmonised standard sets a base level for product performance. Fire system engineers can therefore be reassured that when approved strobes are installed in accordance with the manufacturer's recommendations, they will provide the defined level of illumination in the protected premises. Under the specification, manufacturers have to classify their products as C, ceiling mounted; W, wall mounted; or O, open class devices. In a fire system, both C and W devices will be the primary types used, with some specialised applications having type O devices as well. The C class units often taking the form of a detector base sounder-strobe, fitted between a multi-sensor, smoke or heat detector and its base. W class devices will be either stand-alone strobes or combined sounder-strobes. The key performance indicators are that the output of the device must be greater than 2 candela (cd) and less than 500cd, and the flash rate must be between 0.5 and 2.0Hz.



Ceiling-mounted strobe coverage

The critical requirement from a manufacturer's point of view is that each model must be tested to demonstrate compliance with the standard's requirements. For ceiling-mounted devices, the manufacturer must define the maximum height at which it can be installed, set at a standard 3m, 6m or 9m. A wall-mounted device must be installed at a minimum of 2.4m from the floor. The coverage volume, defined by the manufacturer, in which the output meets the minimum required illumination of 0.4 lumens/m^2 (lux) on a surface perpendicular to the direction of the light emitted from the device is the key performance measure.



Wall-mounted strobe coverage

Further relevant documents are BS 8300, which concerns the design of buildings to meet the needs of disabled people, and LPS1652, *Code of Practice for Visual Alarm Devices used for Fire Warning*, currently at Draft 1.0 status and published by LPCB.

Implications for the fire detection industry

Clearly, the industry welcomes a new product standard that will ensure that alarm signals are as consistent and effective as possible throughout the areas in which they are installed. However, it is apparent that almost no visual alarm device on the market today will meet the requirements of EN54-23 in a manner that will allow the established custom and practice on spacing of devices within protected premises to be maintained. The issue arises because current products – designed to reinforce an audible warning – are often not bright enough to attract attention by themselves at any meaningful distance, unless they are in the direct line of sight.

It would appear to be a relatively simple problem to design and manufacture higher output visual alarm devices. However, there is considerable concern as to whether existing technology – particularly in respect of loop-powered addressable beacons – is able to meet the performance requirements. The limitations arise as the result of the zone current available from the control panel, the inefficiencies converting the incident electrical energy into light, and lenses and reflectors that are not necessarily designed to maximise the light transmission generated by the source. When the use of coloured lenses is added into the equation, the problem is exacerbated

The issue that these deficiencies raise is quite simple: fire system engineers and installers will want to maintain existing spacing when fitting compliant strobes, in order to keep cost and complexity under control. However, initial experiments suggest that using existing technology and designs, the alarm current for a loop-powered strobe is likely to have to rise from the typical value of 3-4mA to 30-40mA, the non-linear increase resulting from efficiency reductions in converting the incident electrical energy into light rather than heat. With a loop typically able to provide around 400mA, this will severely restrict the number of devices, leading to significant system design issues.

Alternative approaches

Accordingly, there are two possible alternative options. Conventional visual alarm devices, interfacing with the loop via modules, could be used. The strobes could be powered from separate power supplies to overcome the current limitation issues, and there are many high output conventional strobes already available that would give the required levels of illumination at a realistic distance. Of course, there are drawbacks. Individual control and management of any particular strobe is lost, and installation and equipments costs will increase with the need for interface modules for each bank of strobes.

The second option is to take the introduction of the new standard as a challenge, and to develop addressable strobes that will generate sufficient output to enable the established customs and practices in system design to be preserved. The size of this task should not be underestimated; it is one that the industry has to overcome in order to improve the protection given to building occupants – particularly those who suffer from total or partial deafness. They should not be placed in greater danger in the event of fire purely because of potential technological difficulties; it is the job of the industry leaders to harness the resources available to provide a workable solution.

In order to improve the conversion efficiency, the new generation of addressable strobes will almost certainly have to use either a Xenon strobe or high output LEDs. Both have potential problems in terms of current draw and heat generation, but they are the most likely contenders in the quest to produce a light output at least an order of magnitude greater than current devices. New designs of reflectors and lenses will be needed to ensure that as much as possible of the generated light is concentrated where it is needed: forwards and down in the case of a wall-mounted device. Almost certainly, white light strobes will become the norm because the greater range of frequencies enables more light energy to be produced.