

# Fire & Gas Visual and Audible Alarm Technical Engineering References for Instrument and Fire & Gas Design Engineers

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[Visual Alarms - Why are Visual Alarms Required?](#) - One American in a hundred has a severe hearing loss; nearly one in ten has a significant loss. In 1984, the Digest of Data on Persons with Disabilities reported that: "(t)he severity of hearing problems was strongly associated with age. persons 65 and older constituted 69 percent of the population with the most severe hearing trouble...but only 8.7 percent of the population without hearing trouble." Those who are deaf or hard-of-hearing--a growing percentage of our population, due largely to the growth in the numbers of older persons--depend upon visual cues to alert them to emergencies. A visual alarm provides persons with hearing loss the same warning delivered to hearing persons by an audible alarm. Audible fire alarms have been a standard feature of building construction since the life safety codes of the early 1900s. However, visible signals did not appear even in accessibility codes until 1980. Early standards required relatively dim flashing lights at exit signs--an alarm system that was effective only along an exit route. As accessibility, life safety, and building codes were revised, however, they began to incorporate alarm technology that was developed for use in schools for persons who are deaf and in factories where ambient noise levels made audible alarms ineffective - from US Access Board.

[Code of Practice for Visual Alarm Devices \(VADs\) Used for Fire Warning](#) - This Code of Practice gives recommendations for the planning, design, installation, commissioning and maintenance of facilities using VADs to give the primary warning of fire to certain persons in and around buildings, other than single-family dwellings - from LPCB.

[Sound Pressure Level](#) - Sound is defined as any pressure variation that can be heard by the human ear. This means an average range of frequencies from 20Hz to 20kHz. In terms of sound pressure level, audible sounds range from the threshold of hearing at 0 dB to the threshold of pain which can be over 130 dB - from e2S.

Audible warning devices and Designing them Effectively in to Fire and Evacuation Alarm Systems - All emergency systems contain audible and visual signals to alert people of danger once a hazard has been detected. It is now accepted that in most systems a form of electronic sounder is initiated via a control panel in order to evacuate or alert people. Many countries have a national 'evacuate tone', i.e. Germany, France, Holland, Australia etc. The UK does not. BS5839 Part 1 merely states that the evacuate tone should contain frequencies within the range of 500Hz to 1000Hz. Fire alarm system designers are in the main very comfortable with designing sounders into normal environments such as offices, hotels etc. as they have a relatively low ambient background noise, most areas are fairly small and may be covered with a sounder(s) of approx. 100dB(A) at 1 metre or a 6" bell. The locations of these sounders are usually based on experience of previous systems or applications and common sense - from e2S.

 12.13 [Alarm Sounder Advice](#) - This technical information sheet from e2S covers;

- How to calculate the effective distance and coverage of an alarm sounder
- How ambient background noise impacts on the effectiveness of the sounder
- Sound Output Attenuation: Frequency and Tone Pattern
- How Many Sounders are Required
- Sounder Design Considerations
- Sound Output of Multiple Sounders
- Disaster Warning / Wide Area Signalling

 12.13 [Decibel Ratings](#) - Sound is defined as any pressure variation that can be heard by the human ear. This means an average range of frequencies from 20Hz to 20kHz. In terms of sound pressure level, audible sounds range from the threshold of hearing at 0 dB to the threshold of pain which can be over 130 dB – from e2S

 12.13 [Visual Signal Advice](#) - This technical information sheet from e2S covers;

- Choice of Luminous Sources
- How to Measure the Light Output (Effective Candela – cd) of a Visual Signal
- Measured Effectiveness compared with Rule of thumb / calculated-only Effectiveness – Xenon Strobe Beacons
- Beacon Effectiveness & Range
- How much Lens Colour Effects the Intensity of a Light Source
- Siting of a Visual Signalling Device
- IEC 73 Colours

 12.13 [Selecting Alarm Stages](#) - Most alarm sounders (and some multi-function beacons) have 2, 3 or 4 'alarm stages'. Below is a brief explanation of how the different stages are activated - From e2S

 12.13 [Signalling in Hazardous Areas](#) - The increasing use of signalling devices to enhance safety in the workplace is to be welcomed. It is particularly important in petro-chemical and oil and gas plants where the potential for serious accidents is far greater than most industrial environments. The author knows this from personal experience: when visiting a site some 15 years ago there was a serious explosion and toxic gas leak. It is at that moment that one realises how tools to warn and control an emergency are absolutely essential - – From e2S

### **Beacons - Emergency Shutdown, Fire & Gas**

[Beacons as used in Fire, Gas and Evacuation Alarm Systems](#) - Covers Luminous sources, Effectiveness & range, Siting of a beacon and IEC 73 - A visual signal (also known as beacon, flash-alarm or strobe) is a luminous source within a coloured transparent enclosure and is used in many applications not least as a reinforcement to an audible signal in the event of danger, warning or machine / system process - from e2S.