

## Fire Alarms:

As part of your fire risk assessment, you may have concluded that a Fire Alarm is necessary to adequately warn people of outbreaks of fire.

Fire Alarms and warning systems can be broken down into 3 major types:

### 1. Manual System:

If the workplace is small and open plan, and it is unlikely that a fire could occur without being noticed and detected at a very early stage, then there may be no need to have a sophisticated fire alarm as a shouted warning, fire bell or gong may be sufficient.

### 2. Electrical System:

In slightly larger premises, where the layout or size of the workplace mean that some people may not hear a shouted warning or simple bell, or, if large numbers of people need to be warned, then an electrical system is likely to be required. Such systems usually contain a system of warning devices (electric sirens, bells or klaxons) which are activated by the 'break-glass' type call-point method. This need not include any automatic fire detectors if there are plenty of people about in all areas of the premises, and it is unlikely that a fire could occur without being noticed and detected at a very early stage

### 3. Automatic System:

In premises where fire could start and grow undetected to the extent where escape from any area of the building may be compromised, then an automatic system is likely to be required. The range and coverage of these systems vary considerably dependant on the premises. These systems are usually designed and installed to recognised standards and codes and consequently expert advice should be sought. Premises where there is a sleeping risk (e.g. Hospitals, Residential Care Homes, Hotels and Boarding Houses, etc) or where parts of the premises are rarely visited or occupied are examples of premises that are particularly likely to need an automatic system.

### So is a fire alarm required?

The Fire Precautions (Workplace) Regulations 1997 (as amended 1999) only **require** fire alarms and/or automatic detection if these are **necessary** to give warning in case of fire. If your risk assessment concludes that no automatic detection system or electrical fire alarm system is necessary, this should be recorded (if there are more than 5 employees) as a **significant finding** in your risk assessment.

### Unwanted Fire Signals: Guidance for reducing unwanted alarms:

#### The Problem

Unwanted alarms can be caused by many types of incident. Most can be eliminated by careful planning. Typical sources of unwanted alarms are:-

- Activation of a smoke detector by airborne pollutants
- Vandalism/malicious action
- Human error (generally due to unfamiliarity with the system)
- Faulty or non-maintained equipment

#### The Cause

The actual cause may be easily identified and resolved, however a more formal approach to analyse the cause may be necessary. This is described below. If you are sure there is no fire, follow the procedure below:

- i) Silence the fire alarm but **do NOT** reset the control panel as this will cancel the indications required for investigation purposes.
- ii) Check the indications on the control panel and establish the area (zone) of the building where the fire alarm originated. Your system may also indicate the precise location of the actuated device.

- iii) As soon as possible after the unwanted alarm occurred, visit the area and locate the break glass call point, heat or smoke detector that has been actuated.
- iv) Attempt to establish the reason why the call point or detector was actuated. It is also useful to talk to people who were in the vicinity of the actuated device when the alarm occurred. Ask them if they know what happened and why. However it may be necessary to investigate further to determine the real cause e.g. vandalism or accidental damage to a break glass call point or insects entering a smoke detector.
- v) If the actuated detector cannot be readily located, it may be that it is fitted in a duct or above a false ceiling. Check to establish if the detector location drawings are available and if so, use these to help locate the detector. Break glass call points should be easier to locate as they should be mounted in clearly visible positions.
- vi) If the control panel does not indicate the location of the fire alarm or if there is no actuated detector, call in the maintenance company as the problem may be due to an equipment fault.
- vii) The occupier should accurately record all the information relating to the fire alarm incident in the system log book irrespective of whether it was a genuine or unwanted alarm. This is very important as the information may be needed to trace recurrent faults, etc..
- viii) If unwanted alarms continue and the cause is not evident or remedial actions are unsuccessful, then it is useful to analyse the times at which unwanted alarms occur and the locations from which they originate. This will help to establish if there is any pattern that may help to identify the cause e.g. cooking prior to meal times or a boiler switching on early in the morning.

### **Investigate**

The investigations and the analysis should lead to a conclusion that the unwanted alarms are the result of one or more of the following causes:

i) Human errors. It is likely that the problem can be overcome by a change of existing practices e.g. the issuing of 'permits to work' or the training of building occupiers. Examples of this type of problems are:

- Smoke caused by building contractors undertaking 'hot work' close to smoke or heat detectors
- Alterations to the fire alarm system wiring without isolating the system.

ii) Process induced alarms. Many unwanted alarms result from processes undertaken adjacent to fire detectors, particularly smoke detectors. A well known example being the result of burning toast in a toaster. Such unwanted alarms can be remedied by either changing the location of the offending process, changing the detector type or its location or by changing the way the fire alarm system is configured.

iii) Equipment faults. If there are equipment faults, these will need to be discussed with the fire alarm system maintainer and appropriate action taken to remedy them. Effective, regular maintenance, which includes the internal and external cleaning of smoke detectors, will minimise such faults occurring in the first instance.

iv) Malicious actuation This cause can be the most difficult to determine and often requires careful analysis of the occurrences. Examples include:

- The malicious operation of break glass call points
- The illicit ownership and use of call point test keys e.g. by school pupils
- The intentional directing of smoke, e.g. from a cigarette into a smoke detector
- Actuation of an unsecured control panel usually as a result of the control enable key being left in the panel.

You should consider all these factors in relation to your building and develop a plan to avoid unwanted alarms.

Further information on reducing unwanted fire alarm signals is given in the ODPM publication:

['A guide to reducing the number of false alarms from fire detection and fire alarm systems'](http://www.bfpsa.org.uk/pdfs/ODPM%20False%20Alarm%20Booklet.pdf).

(Link to - <http://www.bfpsa.org.uk/pdfs/ODPM%20False%20Alarm%20Booklet.pdf>)

## **IMPORTANT:**

**BEFORE CARRYING OUT ANY TESTS ON THE SYSTEM, CONSULT YOUR INSTALLER OR SERVICE ENGINEER TO CONFIRM THAT THE PROPOSED CHECKS ARE CORRECT AND APPROPRIATE FOR YOUR SYSTEM**

### **SIMPLE FIRE ALARM MAINTENANCE PROCEDURE:**

| Testing and Maintaining your Fire Alarm System  |   |   | REMEMBER – Whatever system you use, all employees (or persons covered by the system) should know the fire alarm system and what it sounds like and any fire procedures in place.<br><br><b>Practice your fire warning routine.</b><br><br>All electrical fire alarm systems should be designed, installed maintained and operated in accordance with BS5839 or an equivalent standard.<br><br>A competent person should carry out all work involving fire alarm and detection systems. On completion of any work, the installer should provide a certificate stating that the work complies with the above standard(s).<br><br>Further guidance is available in the publication 'FIRE SAFETY – An Employers Guide <a href="http://www.official-documents.co.uk/document/fire/index.htm">www.official-documents.co.uk/document/fire/index.htm</a> |
|---|---|---|--|
| Responsible Person                              | Competent Person (Normally a fire alarm engineer)     |   |  |
| WEEKLY  | 6 MONTHLY   | ANNUALLY  |  |
| Check indicator panel.                          | Visually check all manual call points and detectors.  | Test all manual call points.                      |  |
| Test one manual call point.                     | Test one call point and one detector on each circuit. | Test all detectors.                               |  |
| Allow alarm to sound for a maximum of 1 minute. | Further checks as recommended by the manufacturer     | Further checks as recommended by the manufacturer |  |
| Record the test.                                | Record the details                                    | Record the details                                |  |

### **DETAILED FIRE ALARM MAINTENANCE PROCEDURE:**

**The following is derived from BS5839 and details more thoroughly a testing regime for a Fire Alarm System**

#### **Fire Alarm Testing & Maintenance Routine testing: General**

*Although modern fire alarm systems may incorporate a high degree of monitoring, so that faults are indicated automatically, it is still necessary for the responsible person nominated by the user to ensure that fault indications at the panel are identified for appropriate action. It is also vital for a regular test to be carried out to ensure that there has not been any major failure of the entire system, or a significant part of the system.*

*Routine testing of the system also provides an opportunity for occupants of the building to become, and remain, familiar with the fire alarm signal(s) that the system produces. In systems with staged alarms that incorporate an "Alert" and an "Evacuate" signal, both signals need to be operated on the occasion of each test to ensure that occupants are aware of the existence of both signals and their different meaning.*

### **Recommendations for weekly testing by the user**

When testing the fire detection system, there may be a need to isolate ancillary outputs (such as automated calls to the fire service and/or call handling stations).

The following recommendations apply:

a) Every week, a manual call point should be operated during normal working hours. It should be confirmed that the control equipment is capable of processing a fire alarm signal and providing an output to fire alarm sounders, and to ensure that the fire alarm signal is correctly received at any alarm receiving centre to which fire alarm signals are transmitted. It is not necessary to confirm that all fire alarm sounder circuits operate correctly at the time of this test.

NOTE 1 It is essential that any alarm receiving centre is contacted immediately before, and immediately after, the weekly test to ensure that unwanted alarms are avoided and that fire alarm signals are correctly received at the alarm receiving centre.

NOTE 2 The user needs to take account of the manufacturer's recommendations, particularly when battery powered devices are being tested, e.g. within radio-linked fire alarm systems.

b) The weekly test should be carried out at approximately the same time each week; instructions to occupants should then be that they should report any instance of poor audibility of the fire alarm signal. In systems with staged alarms incorporating an "Alert" and an "Evacuate" signal, the two signals should be operated, where practicable, sequentially in the order they would occur at the time of a fire (i.e. "Alert" and then "Evacuate").

c) In premises in which some employees only work during hours other than that at which the fire alarm system is normally tested, an additional test(s) should be carried out at least once a month to ensure familiarity of these employees with the fire alarm signal(s).

d) A different manual call point should be used at the time of every weekly test, so that all manual call points in the building are tested in rotation over a prolonged period. There is no maximum limit for this period (e.g. in a system with 150 manual call points, the user will test each manual call point every 150 weeks). The result of the weekly test and the identity of the manual call point used should be recorded in the system log book.

e) The duration for which any fire alarm signal is given (other than solely at control and indicating equipment) at the time of the weekly test by the user should not normally exceed one minute, so that, in the event of a fire at the time of the weekly test, occupants will be warned by the prolonged operation of the fire alarm devices.

f) Voice alarm systems should be tested weekly in accordance with the recommendations of BS 5839 part 8.

### **Recommendations for monthly attention by the user**

The following recommendations apply.

a) If an automatically started emergency generator is used as part of the standby power supply, it should be started up once each month by simulation of failure of the normal power supply and operated on-load for at least one hour. The test should be carried out in accordance with the instructions of the generator manufacturer, including instructions on the load that should be operated. At the end of the test, the fuel tanks should be left filled, and the oil and coolant levels should be checked and topped up as necessary.

b) If vented batteries are used as a standby power supply, a visual inspection of the batteries and their connections should be made to ensure that they are in good condition. Action should be taken to rectify any defect, including low electrolyte level.

NOTE Care should be taken to ensure that any person undertaking these tasks is competent to do so safely and has the relevant technical knowledge and training.

### **Inspection and servicing: General**

*It is essential that the system is subject to periodic inspection and servicing so that unrevealed faults are identified, preventive measures can be taken to ensure the continued reliability of the system,*

*false alarm problems are identified and suitably addressed, and that the user is made aware of any changes to the building that affect the protection afforded by the system. Periodic inspection and servicing needs to be carried out by a competent person with specialist knowledge of fire detection and alarm systems, including knowledge of the causes of false alarms, sufficient information regarding the system, and adequate access to spares. This will normally be an outside fire alarm servicing organization; care needs to be taken to ensure that, if, for example, in-house employees are used for this task, they have equivalent competence to the technicians of a typical fire alarm servicing organization. Competence of a fire alarm servicing organization can be assured by the use of organizations that are third-party certificated, by a UKAS-certificated certification body, to carry out inspection and servicing of fire alarm systems.*

### **Recommendation for quarterly inspection of vented batteries**

All vented batteries and their connections should be examined by a person competent in battery installation and maintenance technology. Electrolyte levels should be checked and topped up as necessary.

NOTE In many large premises and sites, in-house maintenance personnel may be competent to carry out this task.

### **Recommendations for periodic inspection and test of the system**

Some fire detection and fire alarm systems and components include features that permit functions to be automatically monitored, and faults or warnings to be annunciated, or otherwise made available to authorized persons. In such cases, the recommendations for routine testing may be modified to omit testing which is declared to be unnecessary by the equipment supplier, provided it can be demonstrated that the automatic monitoring achieves the same objective as the appropriate test recommended. These recommendations in this clause should be carried out by a competent person. The period between successive inspection and servicing visits should be based upon a risk assessment, taking into account the type of system installed, the environment in which it operates and other factors that may affect the long term operation of the system. The recommended period between successive inspection and servicing visits should not exceed six months. If a risk assessment shows a need for more frequent inspection and servicing visits, then an alternative, appropriate inspection and servicing schedule should be adopted.

The periodic inspection and test should include the following general recommendations.

- a) The system log book should be examined. It should be ensured that any faults recorded have received appropriate attention.
- b) A visual inspection should be made to check whether structural or occupancy changes have affected the compliance of the system with the recommendations for the siting of manual call points, automatic fire detectors and fire alarm devices. Particular care should be taken to verify whether:
  - 1) all manual call points remain unobstructed and conspicuous;
  - 2) any new exits have been created without the provision of an adjacent manual call point;
  - 3) any new or relocated partitions have been erected within 500 mm horizontally of any automatic fire detector;
  - 4) any storage encroaches within 300 mm of ceilings;
  - 5) a clear space of 500 mm is maintained below each automatic fire detector, and that the ability of the detector to receive the stimulus that it has been designed to detect has not been impeded by other means;
  - 6) any changes to the use or occupancy of an area makes the existing types of automatic fire detector unsuitable for detection of fire or prone to unwanted alarms;
  - 7) any building alterations or extensions require additional fire detection and alarm equipment to be installed.
- c) The records of false alarms should be checked and the rate of false alarms during the previous 12 months should be recorded.
- d) The standby battery should be disconnected and full load alarm should be simulated.
- e) Batteries and their connections should be examined and momentarily load tested with the mains disconnected (other than those within devices such as manual call points, detectors and fire alarm sounders of a radio-linked system), to ensure that they are in good serviceable condition

and not likely to fail before the next service visit. Vented batteries should be examined to ensure that the specific gravity of each cell is correct.

- f) The fire alarm functions of the control and indicating equipment should be checked by the operation of at least one detector or manual call point on each circuit. An entry should be made in the log book indicating which initiating devices have been used for these tests.
- g) The operation of the fire alarm devices should be checked.
- h) All controls and visual indicators at control and indicating equipment should be checked for correct operation.
- i) The operation of any facility for automatic transmission of alarm signals to an alarm receiving centre should be checked. Where more than one form of alarm signal can be transmitted (e.g. fire and fault signals), the correct transmission of each signal should be confirmed.
- j) All ancillary functions of the control and indicating equipment should be tested.
- k) All fault indicators and their circuits should be checked, where practicable, by simulation of fault conditions.
- l) All printers should be tested to ensure that they operate correctly and that characters are legible. It should be ensured that all printer consumables are sufficient in quantity or condition to ensure that the printer can be expected to operate until the time of the next service visit.
- m) Radio systems of all types should be serviced in accordance with the recommendations of the manufacturer.
- n) All further checks and tests recommended by the manufacturer of the control and indicating equipment and other components of the system should be carried out.
- o) On completion of the work, any outstanding defects should be reported to the responsible person, the system log book should be completed and a servicing certificate should be issued.

#### **Recommendations for inspection and test of the system over a 12 month period**

In addition to the work recommended above, it is recommended that the following work be carried out every year.

NOTE 1 The work described may be carried out over the course of two or more service visits during each twelve month period.

- a) The switch mechanism of every manual call point should be tested, either by removal of a frangible element, insertion of a test key or operation of the device as it would be operated in the event of fire.
- b) All automatic fire detectors should be examined, as far as practicable, to ensure that they have not been damaged, painted, or otherwise adversely affected. Thereafter, every detector should be functionally tested. The tests used need prove only that the detectors are connected to the system, are operational and are capable of responding to the phenomena they are designed to detect.
- c) Every heat detector should be functionally tested by means of a suitable heat source, unless operation of the detector in this manner would then necessitate replacement of part or all of the sensing element (e.g. as in fusible link point detectors or non-integrating line detectors). Special test arrangements will be required for fusible link heat detectors. The heat source should not have the potential to ignite a fire; live flame should not be used, and special equipment might be necessary in explosive atmospheres.
- c) Point smoke detectors should be functionally tested by a method that confirms that smoke can enter the detector chamber and produce a fire alarm signal (e.g. by use of apparatus that generates simulated smoke or suitable aerosols around the detector). It should be ensured that

the material used does not cause damage to, or affect the subsequent performance of, the detector; the manufacturer's guidance on suitable materials should be followed.

- d) Optical beam smoke detectors should be functionally tested by introducing signal attenuation between the transmitter and receiver, either by use of an optical filter, smoke or simulated smoke.
- e) Aspirating fire detection systems should be functionally tested, with each sampling point, or group of sampling points, in the pipework of the system treated as a point detector. Note that not all test products may be appropriate for the purpose.
- g) Carbon monoxide fire detectors should be functionally tested by a method that confirms that carbon monoxide can enter the detector chamber and produce a fire alarm signal (e.g. by use of apparatus that generates carbon monoxide or a gas that has a similar effect on the electro-chemical cell as carbon monoxide).

WARNING Carbon monoxide is a highly toxic gas, and suitable precautions should be taken in its use.

NOTE 2 It should be ensured that any test gas used does not cause damage to, or affect the subsequent performance of, the detector; the manufacturer's guidance on suitable test gases should be followed.

- h) Flame detectors should be functionally tested by a method that confirms that the detector will respond to a suitable frequency of radiation and produce a fire alarm signal. The guidance of the manufacturer on testing of detectors should be followed.
- i) In fire detection systems that enable analogue values to be determined at the control and indicating equipment, it should be confirmed that each analogue value is within the range specified by the manufacturer.
- j) Multi-sensor detectors should be operated by a method that confirms that products of combustion in the vicinity of the detector can reach the sensors and that a fire signal can be produced as appropriate. The guidance of the manufacturer on the manner in which the detector can be functionally tested effectively should be followed.
- k) All fire alarm devices should be checked for correct operation. It should be confirmed that visual fire alarm devices are not obstructed from view and that their lenses are clean.
- l) All unmonitored, permanently illuminated filament lamp indicators at control and indicating equipment should be replaced.
- m) Radio signal strengths in radio-linked systems should be checked for adequacy.
- n) A visual inspection should be made to confirm that all readily accessible cable fixings are secure and undamaged.
- o) The cause and effect programme should be confirmed as being correct.
- p) The standby power supply capacity should be checked to establish it remains suitable for continued service.
- q) All further annual checks and tests recommended by the manufacturer of the control and indicating equipment and other components of the system should be carried out.

On completion of the work, any outstanding defects should be reported to the responsible person and a record of the inspection and test should be made on the servicing certificate.

NOTE 3 Since stimulus of the sensing element through introduction of the phenomena or surrogate phenomena which the above detectors are designed to detect forms part of the test, use of a test button or a test magnet (for example) does not satisfy the recommendations given.