



# Unit 5 Fire Detection and Warning

## Learning Outcomes

**By the end of this unit the learner will be able to:**

- ✓ Determine whether or not an automatic fire detection and warning systems should be installed
- ✓ Evaluate whether existing fire detection and warning systems are adequate
- ✓ Ensure fire detection and warning systems are functional by performing the appropriate tests

## Unit 5

### Fire Detection and Warning Systems

In some small, open-plan, single-storey offices and shops, a fire may be obvious to everyone as soon as it starts. In these cases, where the number and position of exits and the travel distance to them is adequate, a simple shout of 'fire' or a simple manually operated device, such as a gong or air horn that can be heard by everybody when operated from any single point within the building, may be all that is needed. Where a simple shout or manually operated device is not adequate, it is likely that an electrical fire warning system will be required.

In larger premises, particularly those with more than one floor, where an alarm given from any single point is unlikely to be heard throughout the building an electrical system incorporating sounders and manually operated call points (break-glass boxes) is likely to be required. This type of system is likely to be acceptable where all parts of the building are occupied at the same time and it is unlikely that a fire could start without somebody noticing it quickly.

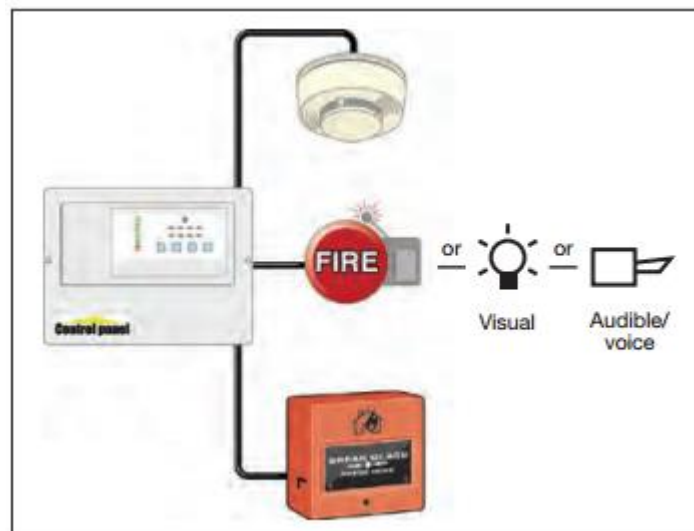


Figure 5.1 Fire detection and warning system

However, where there are unoccupied areas, or common corridors and circulation spaces in multi-occupied premises, in which a fire could develop to the extent that escape routes could be affected before the fire is discovered, an automatic fire detection system may be necessary.

You may need to consider special arrangements for times when people are working alone, are disabled, or when your normal occupancy patterns are different, e.g. when maintenance staff or other contractors are working at the weekend.


In large or complex premises, particularly those accommodating large numbers of people, such as department stores and multi-storey office blocks, it is likely that a more sophisticated form of warning and evacuation, possibly phased, should be provided.

False alarms from electrical fire warning systems are a major problem (e.g. malicious activation of manual call points) and result in many unwanted calls to the fire and rescue service every year.

To help reduce the number of false alarms, the design and location of activation devices should be reviewed against the way the premises are currently used.

Where an electrical fire-warning system is necessary then a straightforward arrangement

**Checklist**



- Can the existing means of detection ensure a fire is discovered quickly enough for the alarm to be raised in time for all the occupants to escape to a place of total safety?
- Are the detectors of the right type and in the appropriate locations?
- Can the means of warning be clearly heard and understood by everyone throughout the whole building when initiated from a single point?
- Are there provisions for people or locations where the alarm cannot be heard?
- If the fire-detection and warning system is electrically powered, does it have a back-up power supply?

typically includes the following:

- manual call points (break-glass call points) next to exits with at least one call point on each floor;
- electronic sirens or bells; and
- a control and indicator panel.

An alternative system of interconnected combined manual call points and sounders may be acceptable.

If your building has areas where a fire could develop undetected or where people work alone and might not see a fire, then it may be necessary to upgrade your fire-warning system to incorporate automatic fire detection or install an automatic fire-detection and warning system.

If, for any reason, your system fails you must still ensure that people in your premises can be warned and escape safely. A temporary arrangement, such as gongs, whistles or air horns, combined with suitable training, may be acceptable for a short period, pending system repairs.

The fire warning sound levels should be loud enough to alert everyone, taking into account background noise. In areas with high background noise, or where people may be wearing hearing protectors, the audible warning should be supplemented, e.g. with visual alarms.

### People with Hearing Difficulties

Where people have hearing difficulties, particularly those who are profoundly deaf, then simply hearing the fire warning is likely to be the major difficulty. If these persons are never alone while on the premises then this may not be a serious problem, as it would be reasonable for other occupants to let them know that the building should be evacuated. If a person with hearing difficulties is likely to be alone, then consider other means of raising the

alarm. Among the most popular are visual beacons and vibrating devices or pagers that are linked to the existing fire alarm.

### **Voice Alarms**

Research has shown that some people and, in particular, members of the public, do not always react quickly to a conventional fire alarm. Voice alarms are therefore becoming increasingly popular and can also incorporate a public address facility. The message or messages sent must be carefully considered. It is therefore essential to ensure that voice-alarm systems are designed and installed by a person with specialist knowledge of these systems.

### **Schematic Plan**

In order to quickly determine where a fire has been detected, you should consider displaying a schematic plan showing fire alarm zones in a multi-zoned system adjacent to the control panel.

### **Manual Call Points**

Manual call points, often known as ‘break-glass’ call points, enable a person who discovers a fire to immediately raise the alarm and warn other people in the premises of the danger.

People leaving a building because of a fire will normally leave by the way they entered. Consequently, manual call points are normally positioned at exits and storey exits that people may reasonably be expected to use in case of fire, not just those designated as fire exits.

However it is not necessary in every case to provide call points at every exit.

Manual call points should normally be positioned so that, taking into account all fixtures and fittings, machinery and stock are in place, no one should have to travel more than 45m to the nearest alarm point. This distance may need to be less if your premises cater for people of limited mobility or there are particularly hazardous areas. They should be conspicuous (red), fitted at a height of about 1.4m (or less for premises with a significant number of wheelchair users), and not in an area likely to be obstructed.

### **Automatic Fire Detection**

Automatic fire detection may be needed for a number of reasons. These can include:

- if you have areas where people are isolated or remote and could become trapped by a fire because they are unaware of its development, such as lone workers;
  - if you have areas where a fire can develop unobserved (e.g. storerooms);
  - as a compensating feature, e.g. for inadequate structural fire protection, in dead-ends or where there are extended travel distances; and
  - where smoke control and ventilation systems are controlled by the automatic fire-detection system.
- If you have an automatic fire detection system, the system should:
- be designed to accommodate the emergency evacuation procedure;

- give an automatic indication of the fire warning and its location. If the indicator panel is located in a part of the premises other than the control point (for example, to the secretary's office) there should ideally be a repeater panel sited in the control point;
- be maintained and tested by a competent person; and
- communicate with a central control room (if you have one).

New automatic fire detection systems should be designed and installed by a competent person. Further guidance is given in BS 5839-1 or a more recent standard where applicable.

Where the public address system is part of the fire warning system it should be connected to an auxiliary power source to ensure the continued use of the system in the event of fire or other emergency.

Whichever warning or detection systems are in place, however, if a fire occurs the fire and rescue service should always be called immediately.

### **Reducing False Alarms**

False alarms from automatic fire detection systems are a major problem and result in many unwanted calls to the fire and rescue service every year.

If there are excessive false alarms in your premises, people may become complacent and not respond correctly to a warning of a real fire. In such circumstances, you may be failing to comply with fire safety law. All false alarms should be investigated to identify the cause of the problem and remedial action taken.

To help reduce the number of false alarms, the system design and location of detection and activation devices should be reviewed against the way the premises are currently used. For example, if a store room has been converted to staff area with cooking facilities (e.g. a microwave and toaster) then the likelihood of the detector being set off is increased. Consequently, subject to the outcome of the fire risk assessment a heat detector may be more appropriate.

Similarly, if a manual call point is placed in a storage area where there is continual movement of stock, the call point is likely to be accidentally damaged. In this case a simple, fabricated hinged metal guard around the call point is likely to solve the problem.

Occasionally people set off a manual call point in the genuine, but incorrect belief that there is a fire. Nothing should be done to discourage such actions and the number of false alarms generated this way is not significant.

### **Staged Fire Alarms**

In the vast majority of premises sounding the fire warning system should trigger the immediate and total evacuation of the building. However, in some large or complex premises this may not be necessary as alternative arrangements may be in place.

These alternative arrangements broadly fall into two groups. Firstly, those people potentially most at risk from a fire, usually those closest to where the alarm was activated, will be immediately evacuated, while others in the building are given an alert signal and will only

evacuate if it becomes necessary. This is generally called a phased evacuation and the initial movement, depending on the layout and configuration of the premises, can be either horizontal or vertical.

The second alternative is for the initial alert signal to be given to certain staff, who then carry out pre-arranged actions to help others to evacuate more easily. It requires able, fully-trained staff to be available at all times and should not be seen as a simple means of reducing disruption to working practices.

Where staged alarms are being used, disabled people should be alerted on the first stage to give them the maximum time to escape.

These arrangements both require fire-warning systems capable of giving staged alarms, including an 'alert signal' and a different 'evacuate signal' and should only be considered after consultation with specialist installers and, if necessary, the relevant enforcing authority.

Such systems also require a greater degree of management input to ensure that staff and others are familiar with the system and action required.

### **Testing and Maintenance**

Your fire-warning and/or detection system should be supervised by a named responsible person, given enough authority and training to manage all aspects of the routine testing and scrutiny of the system.

The control and indicating equipment should be checked at least every 24 hours to ensure there are no specific faults. All types of fire-warning systems should be tested once a week. For electrical systems a manual call point should be activated (using a different call point for each successive test), usually by inserting a dedicated test key.

This will check that the control equipment is capable of receiving a signal and in turn, activating the warning alarms. Manual call points may be numbered to ensure they are sequentially tested. Testing and maintenance of the system should be carried out by a competent person.



*Figure 5.2: Using a test key*

It is good practice to test the alarm at the same time each week, but additional tests may be required to ensure that staff or people present outside normal working hours are given the opportunity to hear the alarm.

Where systems are connected to a central monitoring station, arrangements should be made prior to testing to avoid unwanted false alarms.

Six-monthly servicing and preventive maintenance should be carried out by a competent person with specialist knowledge of fire-warning and automatic detection systems. This task is normally fulfilled by entering into a service contract with a specialist fire alarm company.

It is good practice to record all tests, false alarms and any maintenance carried out.

### **Guaranteed Power Supply**

If your fire risk assessment concludes that an electrical fire-warning system is necessary, then the Health and Safety (Safety Signs and Signals) Regulations 1996 requires it to have a back-up power supply.

Whatever back-up system is used, it should normally be capable of operating the fire-warning and detection system for a minimum period of 24 hours and sounding the alarm signal in all areas for 30 minutes.

### **New and Altered Systems**

If you are unsure that your existing system is adequate you will need to consult a competent person.

### Further Reading:

- ✓ An Early Warning System for Forest Fire Detection Based on WSN Paperback – April 30, 2018 by Fazal Khaliq (Author), Saeed Ullah Jan (Author)
- ✓ Fire Alarm Testing log book: Fire Inspection And Testing Fire Incident And Prevention-simple log book to record and Fire Register for landlords,tenants,businesses and schools to ensure compliance . Paperback – March 21, 2021 by Emma Johan Planner (Author)