Inspection & Testing • Training • Design

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ELECTRICAL ENGINEERING CONSULTANCY

Fire Alarm Grading & Design

A Guide to Installation

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Dual Point Systems (EG – Twinflex)

The conventional fire alarm system incorporating the Multipoint combined smoke and heat detector with built in sounder means the whole system can be installed using only one pair of wires.

Using the Multipoint detector as part of the 2-wire fire alarm system means that when a detector is wired in, a sounder is wired in too -- with no extra wiring, therefore greatly reducing the number of points that need to be installed and the time it takes to install them.

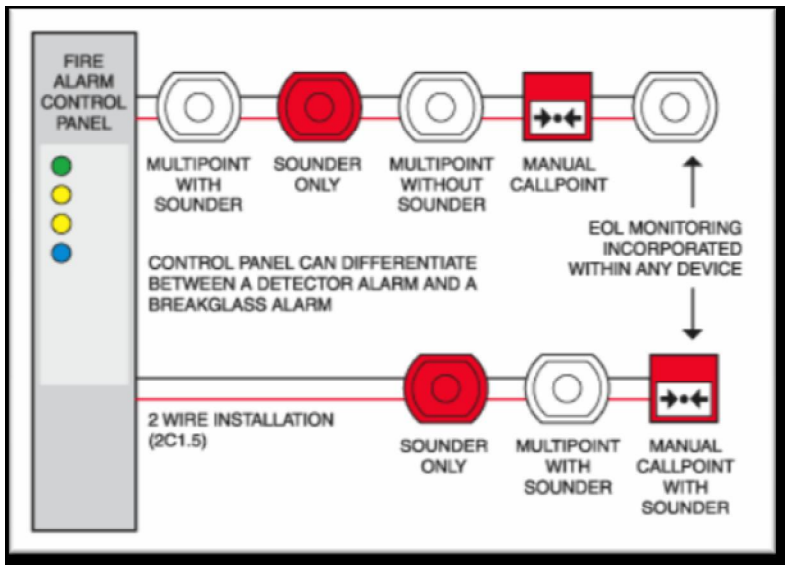
As the Multipoint offers 7 different modes of detection, the installation is made even simpler as this one device suits all applications. Whatever type of detection is required, for any part of the installation it can be selected by the flick of a switch at the time of commissioning. Any one of 3 different smoke modes, 2 fixed temperature heat modes, a rate of rise mode and a combination smoke or heat mode can be selected.

As the Twinflex Multipoint detector is available with or without a full specification 90 dB(A) sounder no extra devices need to be purchased when audible warning is required. (Meets audibility levels recommended in BS5839 Part 1:1988). Twinflex Manual Call Points can be run on the same pair of wires as detectors. Both detectors and Manual Call Points have a built in EOL switch so that any device may be set as the end of line monitor. The panel can also differentiate between a Manual Call Point and a Detector alarm. If extra sound is required, or for areas that do not require detection, then the Twinflex Hatari sounder may be used on the same two wires, offering sound output of 100dB(A). It also has a built in EOL monitoring switch.

The panel can accommodate up to 32 devices per zone, has separate fault monitoring displays for each zone, and a one man walk test facility. Zones are configured without the need to use resistors or capacitors on unused zones.

The system is installed on 2 core and earth cable for each zone which supports automatic detectors, combined detectors/sounders, manual callpoints and stand alone electronic sounders. Each of the devices in the system has the facility of a built in end of line fault monitoring device operated by means of a DIL switch.

Multi criteria detector includes 7 detector modes by means of a DIL switch within the device. These modes include 3 'optical smoke detection' of varying sensitivity with thermal enhancement to comply with EN54 part 7. 3 heat detection modes include rate of rise (EN54 part 5 grade 1), fixed temperature (EN54 part 5 grade 2) and high fixed temperature (EN54 part 8 temperature range 1). A combined smoke or heat detection mode which can alarm on smoke or heat.



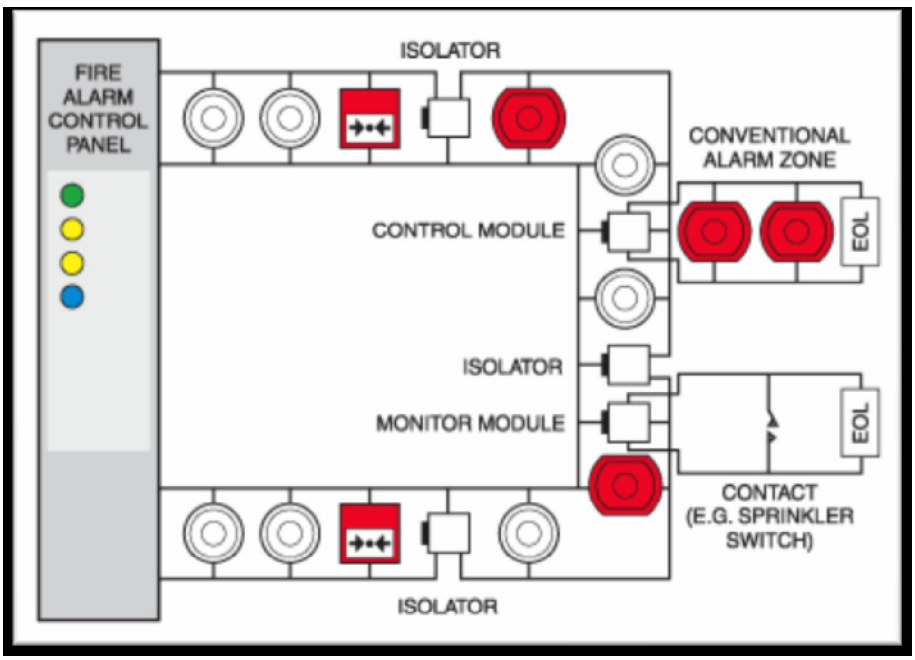
Conventional fire alarm systems:

Conventional fire alarm systems provide an adequate and cost effective fire alarm system for many small buildings. In larger, more complex buildings however, more sophisticated 'intelligent' fire alarm systems tend to be used. These systems offer benefits in speed of detection, identification of the location of a fire and easier maintenance. Intelligent systems also offer tolerance to faults in the system wiring, which allows a single pair of wires to be used to connect up to 198 devices to the system, allowing cost savings in the wiring of large systems. In larger installations, the benefits of improved maintenance and reduced cabling cost are overwhelming. Currently, the point at which an intelligent system becomes economical is around 6 zones in the UK.

Figure 4.1.3 demonstrates an example of a single loop intelligent fire system layout. The wiring is looped, and connects to the control panel at each end. All detectors, call points, sounders and interface modules are wired directly to the loop, each having its own address. The control panel communicates with each device on the loop, and if an alarm or fault condition is signalled, or if communications are lost with one or more detectors, the appropriate response is triggered. The loop can be powered from each end so that if the loop is broken at any point, no devices are lost.

In order to give tolerance against short circuits on the loop, short circuit isolators are placed at intervals on the loop. Should a short circuit occur on the loop the isolators directly on either side of the fault will isolate that section. The panel will detect the loss of the devices, signal a fault and drive the loop from both ends, thereby enabling the remainder of the loop to operate correctly and ensuring minimum loss of coverage.

Short circuit isolators are available as separate modules or incorporated into a detector base.



Design:

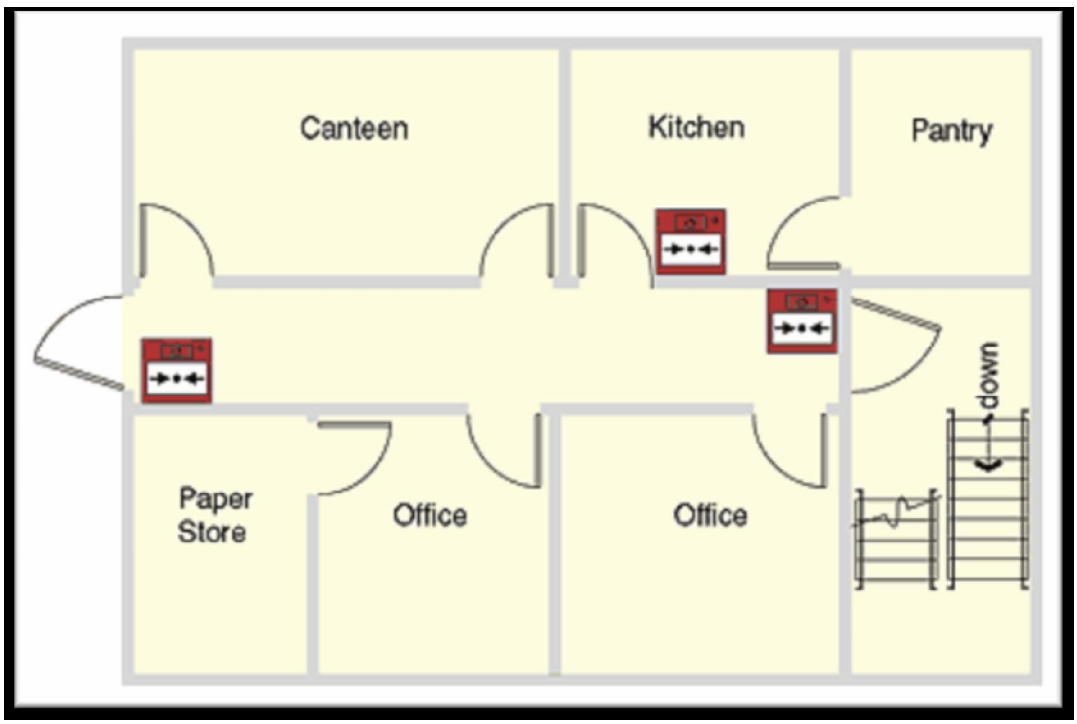
Before a fire protection system can be designed, it is necessary to define the main objectives of the system.

This is normally determined by a fire risk assessment, and should be provided as part of the fire system specification. BS5839 Part 1: 2002 defines three basic categories of fire detection system.

Category M systems rely on human intervention, and use only manually operated fire detection such as break glass call points.

A category M system should only be employed if no one will be sleeping in the building, and if a fire is likely to be detected by people before any escape routes are affected.

Any alarm signals given in a category M system must be sufficient to ensure that every person within the alarm area is warned of a fire condition.

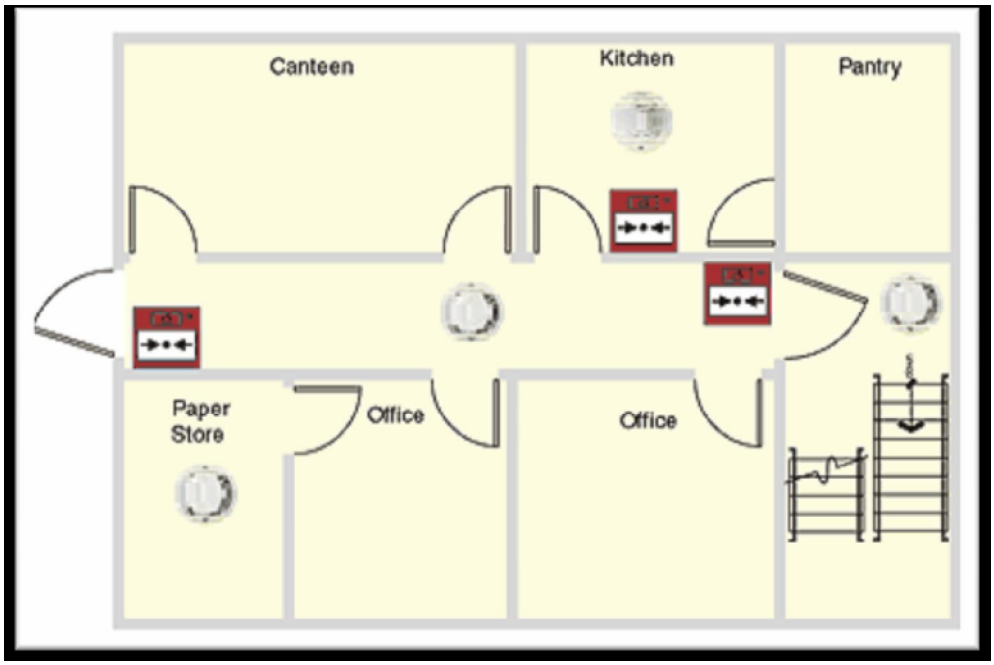


CATEGORY L SYSTEMS

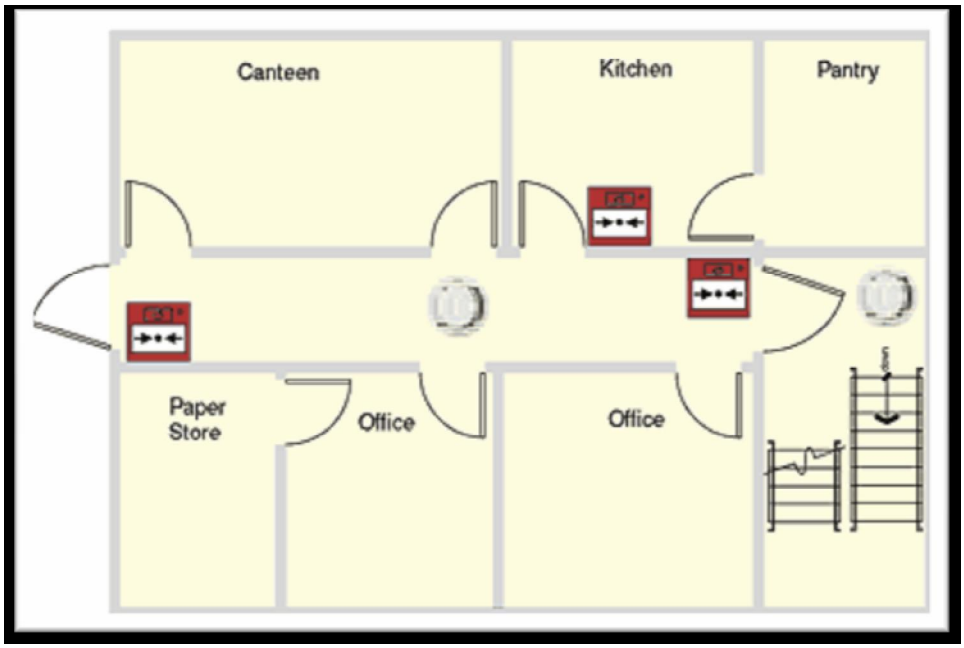
Category L systems are automatic fire detection systems intended to protect life. The category is further subdivided as follows:

In a **category L5** system certain areas within a building, defined by the fire system specification, are protected by automatic fire detection in order to reduce the risk to life.

This category of system may also include manual fire protection.

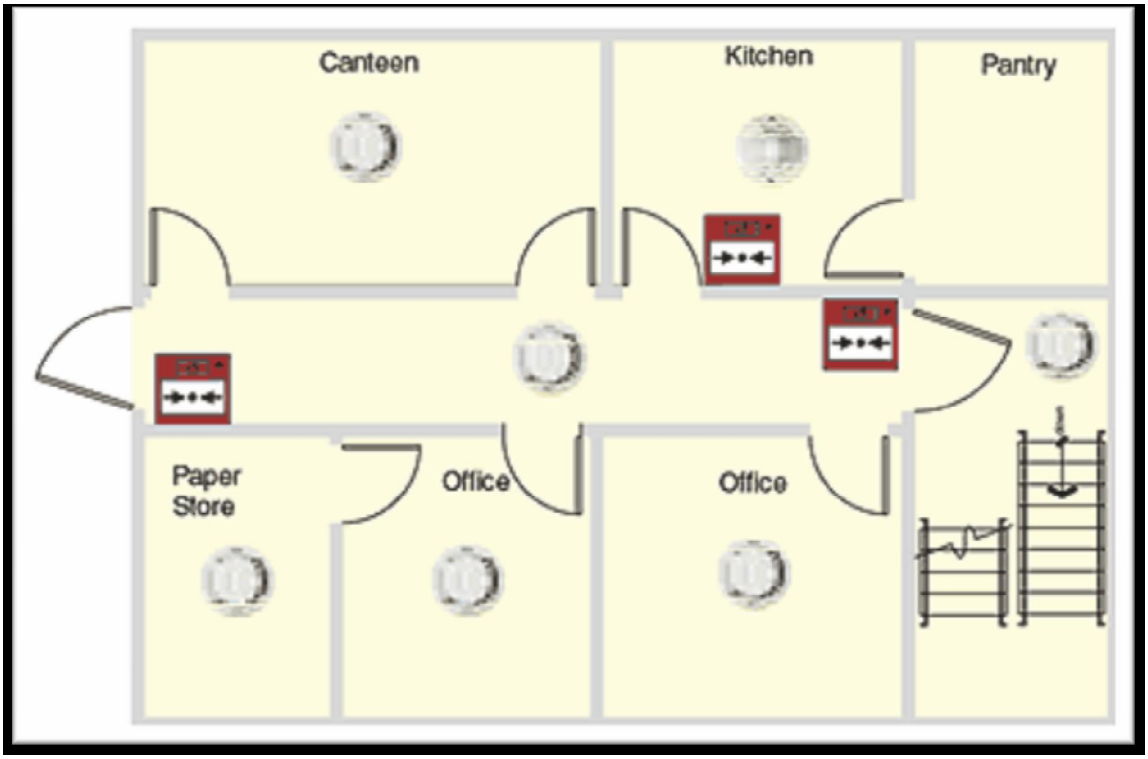


Category **L4**: Designed to offer protection to the escape routes from a building.
The system should comprise Category M plus smoke detectors in corridors and stairways.



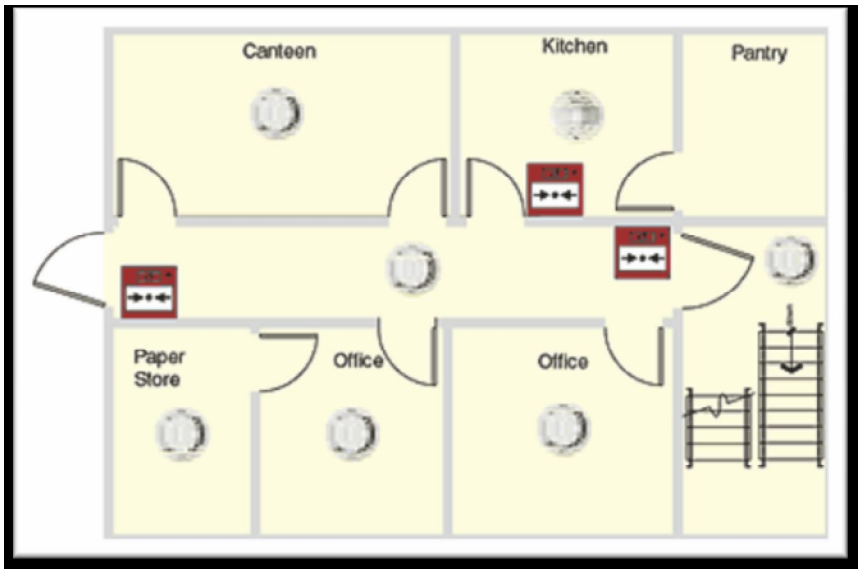
Category **L3**: Intended to offer early enough notification of a fire to allow evacuation before escape routes become smoke logged.

Protection should be as for category L4 with the addition of smoke or heat detectors in rooms opening onto escape routes.



Category **L2**: Objectives are similar to category **L3**, however additional protection is provided for rooms at higher risk.

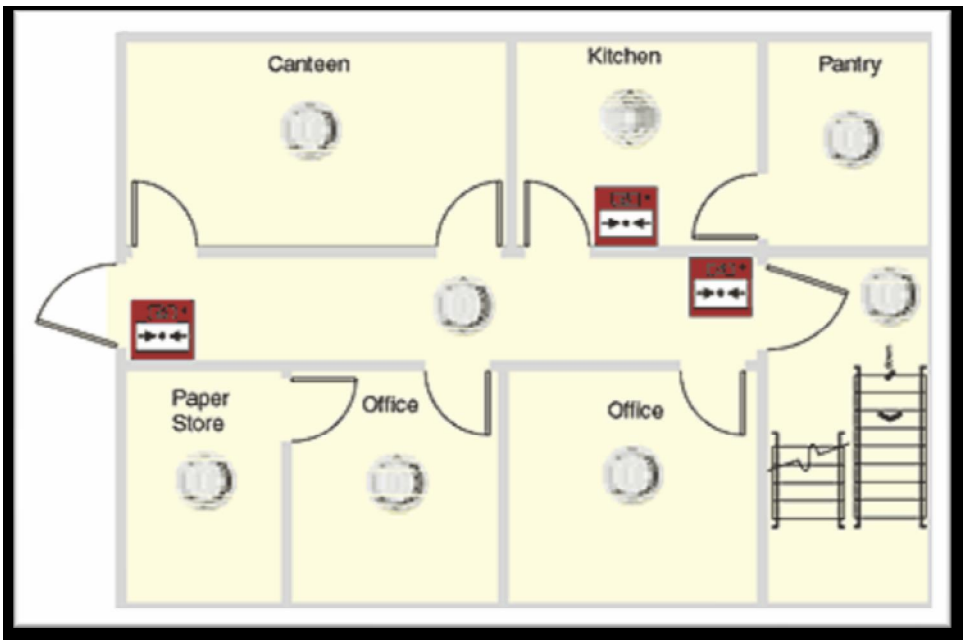
Protection should be as for category L3 plus smoke detectors in specified rooms at high risk.



Category **L1**: The highest category for the protection of life. Intended to give the earliest possible notification of a fire in order to allow maximum time for evacuation.

Automatic and manual fire detection installed throughout all areas of the building. Smoke detectors should be employed wherever possible to protect rooms in which people can be expected to be present.

Similarly to class M systems, all alarm signals given in a category L system must be sufficient to warn all those people for whom the alarm is intended to allow for a timely evacuation.

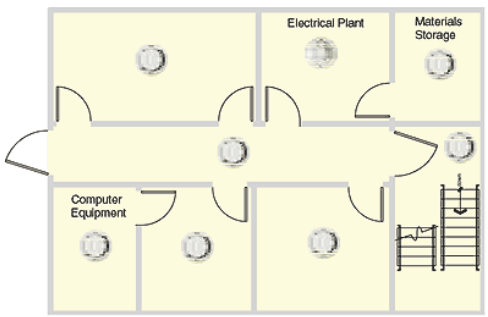


CATEGORY P SYSTEMS

Category P systems are automatic fire detection systems whose primary objective is to protect property. The category is subdivided as follows:

Category P systems are intended to provide early warning of fire in areas of high hazard, or to protect high-risk property. Automatic fire detection should be installed in defined areas of a building. The objective of a category P1 system is to reduce to a minimum the time from the ignition of a fire to the arrival of the fire brigade.

In a P1 system, fire detectors should be installed throughout a building.



MANUAL CALL POINTS

People can often still detect a fire long before automatic fire detectors; hence manual call points are important components of fire detection systems in occupied buildings to ensure timely evacuation in the case of fire.

All call points should be BS or BSEN approved, and should be of type A, that is once the frangible element is broken or displaced the alarm condition is automatic.

Manual call points should be mounted on all escape routes, and at all exit points from the floors of a building and to clear air. It should not be possible to leave the floor of a building without passing a manual call point, nor should it be necessary to deviate from any escape route in order to operate a manual call point.

Call points mounted at the exits from a floor may be mounted within the accommodation or on the stairwell. In multiple storey buildings where phased evacuation is to be used call points should be mounted within the accommodation to avoid activation of call points on lower levels by people leaving the building.

In order to provide easy access, call points should be mounted between 1.2 and 1.6m from the floor, and should be clearly visible and identifiable. The maximum distance anyone should have to travel in order to activate a manual call point is 45m, unless the building is occupied by people having limited mobility, or a rapid fire development is likely, in which case the maximum travel distance should be reduced to 20m.

Call points should also be sited in close proximity to specific hazards, for example kitchens or paint spray booths.

Manual Call Points: