

Appendix C

Selection and Siting of Fire Detection System

C 1 GENERAL

This appendix provides information for selection and siting of equipment for fire detection in buildings.

C 2 CHOICE OF FIRE DETECTORS

Fire detectors may respond to any one manifestation of combustions such as heat generation, smoke and flames.

Smoke detectors are not naturally suitable in places where the production process produces smokes.

Application of flame detectors are restricted due to the fact that all combustions do not necessarily accompany flame and that clear line of sight is desirable as radiation from flames travel in straight lines for actuation of sensitive element.

No single detector is able to meet the need of all types of fires and all types of occupancies. As such, based on needs arising out of various situations and occupancies, judicious selection is extremely important for the reduction of fire hazards.

C 2.1 Heat Detectors

"Point" or "Spot" type detectors are actuated by heat at layer adjacent to it over a limited area. "Line" type detectors are sensitive to the effect produced by heated gas along any portion of the detector line. Both the types operate on two broad principles: one, the heat sensitive elements is actuated by temperature rising beyond a predetermined level; while the second system is actuated by predetermined rate of rise of temperature.

C 2.2 Flame Detectors

Flame detectors are sensitive to radiation emitted by flames.

Since heat, smoke and flame are produced during a fire, detectors responding to all these are accepted as general purpose detectors.

Fixed temperature heat detectors are suitable for use where ambient temperatures are high and or may rise and fall rapidly over a short period.

C 2.3 Rate of Rise Heat Detectors

These are suitable for use where ambient temperatures are low and/or may rise over a wide range slowly. Abnormally sharp rise in temperature during a fire actuates this alarm. As such it cannot be used with confidence where ambient temperatures reaches in the neighborhood of 40°C, but are best used where ambient temperatures are in the range of about 40°C.

C 2.4 Smoke Detectors

Three types of smoke detectors are commonly used. First type is actuated by absorption or scattering of visible or near-visible light by combustion product and known as "optical detector". The second type is actuated by the production on ionization current within the detector and referred to as "ionization detector". The third type is sensitive to carbon monoxide or other products of combustion and is known as "chemically sensitive detector". In general, these should be used at places where ambient temperature varies between 0° to 35°C.

C 2.4.1 Optical Smoke Detectors

Invisible smoke from a clear burning shall not actuate such detectors. But they respond quickly where smoke is optically dense and as such suitable for use in dust free clean atmosphere. Over a period of time, due to dust and dirt, the sensitive surface of photo sensitive element and/or excutor lamp of optical detectors may loss its efficiency and as such optical detectors should be cleaned and maintained regularly.

C 2.4.2 Ionization Chamber Smoke Detectors

These responds quickly to invisible smoke of clear burning, but may not respond to fire producing dense smoke. These can be used in dust free, humidity controlled area. Smoke and other fumes, dust including slow accumulated and disturbed aerial dust, fiber, steam and condensation produced by normal processes and vehicle engines may cause false alarm. Warehouses exposed to fast air flows can also cause false alarm. Burning of polyvinyl chloride will not sensitize the detector in time and may provide late warning or no warning at all.

C 2.4.3 Chemically Sensitive Smoke Detectors

Chemically coated sensitive elements react to carbon monoxide or other products of combustion present in smoke. Dust or moisture adversely affects the sensitive elements and are not very suitable for residential use.

C 3 SITING OF DETECTORS

Considering the prevailing weather condition of the occupancies and the problem of false alarm, the type of detectors and the area of coverage shall be decided. Area of coverage of detectors is dependent on many factors. The following aspects shall be taken into considerations in the design of detectors.

- a. Various forms of overhead heating
- b. Exhaust air from air cooling equipment blowing out into the room or factory area
- c. Deep beams
- d. Roofs and ceiling of unusual shape
- e. Building with ground areas above 10 m and up to 30 m in height
- f. Staircases
- g. Canteen and Restaurants
- h. Plant Rooms
- i. Ambulant air currents