**TCXD** **CONSTRUCTION STANDARDS**

# TCXD 218: 1998

# (ISO 7240-1: 1998)

# FIRE DETECTION AND ALARM SYSTEMS - GENERAL

**(This English version is for reference only)**

**HA NOI – 1998**

## Foreword

TCXD 218:1998 was identical to ISO 7240-1:1988.

TCXD 218:1998 was prepared by the Institute of Architectural Research, proposed by the Science and Technology Department- Ministry of Construction and promulgated by Ministry of Construction.

# FIRE DETECTION AND ALARM SYSTEMS - GENERAL

## 1. Scope

This standard specifies components of fire detection and alarm systems, requirements for their interconnection and installation and the performance, testing and servicing of parts or of complete systems.

This standard is applied and provides a set of general guidelines and definitions to be used in the fire detection and alarm system for the house.

Besides, this standard was the basis for assessing this system used with the other purpose, such as for mines, ship.

The components that a fire detection and alarm system can have are shown in Figure 1.

Fire detectors can be self-contained: these are devices containing within one housing all the components, except possibly the energy source, necessary for detection of fire and giving an audible alarm. Inter-connected smoke alarms equipment shall be concerned in one other standard.

NOTE: Inter-connected smoke alarms shall be not connected to control and indicating equipment do not form a fire detection and alarm system as defined in this standard.

## 2. General guidelines.

**2.1.** The purpose of a fire detection and alarm system is to detect fire at the earliest practicable moment and to give an alarm so that the appropriate action can be taken (e.g. evacuation of occupants, summoning the firefighting service, triggering of extinguishing equipment, control of smoke doors, dampers and fans).

A fire alarm system may be activated by automatic detection devices or by manual operation.

**2.2.** The general principles given in 2.3 to 2.7 are guidelines to the design and construction of fire detection and alarm systems.

**2.3.** A fire detection and alarm system should:

- detect quickly enough to fulfill its intended function;
- reliably transmit the detection signal to the control and indicating equipment and, if applicable, the fire alarm receiving station;
- translate this detection signal into a clear alarm signal that attracts the attention of the occupant in an immediate and unmistakable way;
- remain insensitive to phenomena other than those which its function is to detect;
- signal immediately and clearly any supervised fault that might jeopardize the correct performance of the system.

**2.4.** A fire detection and alarm system should not

- be adversely affected by any other systems whether associated with it or not;
- be rendered partially or totally inoperative by the fire or the phenomenon which it is designed to detect before the fire or phenomenon has been detected

**2.5.** A fire detection and alarm system should be reliable. A system is reliable when it fulfils its intended functions without errors or omissions.

**2.6.** compliance of components of fire detection and alarm systems with requirement in this standard does not necessarily ensure the compatibility of components with each other. Compatibility should be considered when designing a system. Satisfactory operation of an installed system should be confirmed by testing after completion of the installation.

**2.7.** Any fault affecting a part of a fire detection and alarm system should result in further faults in the system as a whole or indirect hazards outside the system.

**3. Terms and definitions:**

For the purposes of this standard, the following terms and definitions apply.

**3.1. Automatic fire detection (and alarm) system:**

System in which an alarm of fire can be initiated automatically.

**3.2. Manual fire alarm system:**

System (not containing fire detectors) in which an alarm of fire can only be initiated manually.

**3.3. Fire detector (see Figure 1, item B):**

Part of an automatic fire detection system that contains at least one sensor which constantly or at frequent intervals monitors at least one suitable physical and/or chemical phenomenon associated with fire, and that provides at least one corresponding signal to the control and indicating equipment (see

Figure 1, item B). The decision to give that alarm of fire or to operate automatic fire protection equipment may be made at the detector or at the control and indicating equipment.

Fire detectors can also be defined as checked phenomenon as in 3.3.1 to 3.3.5.

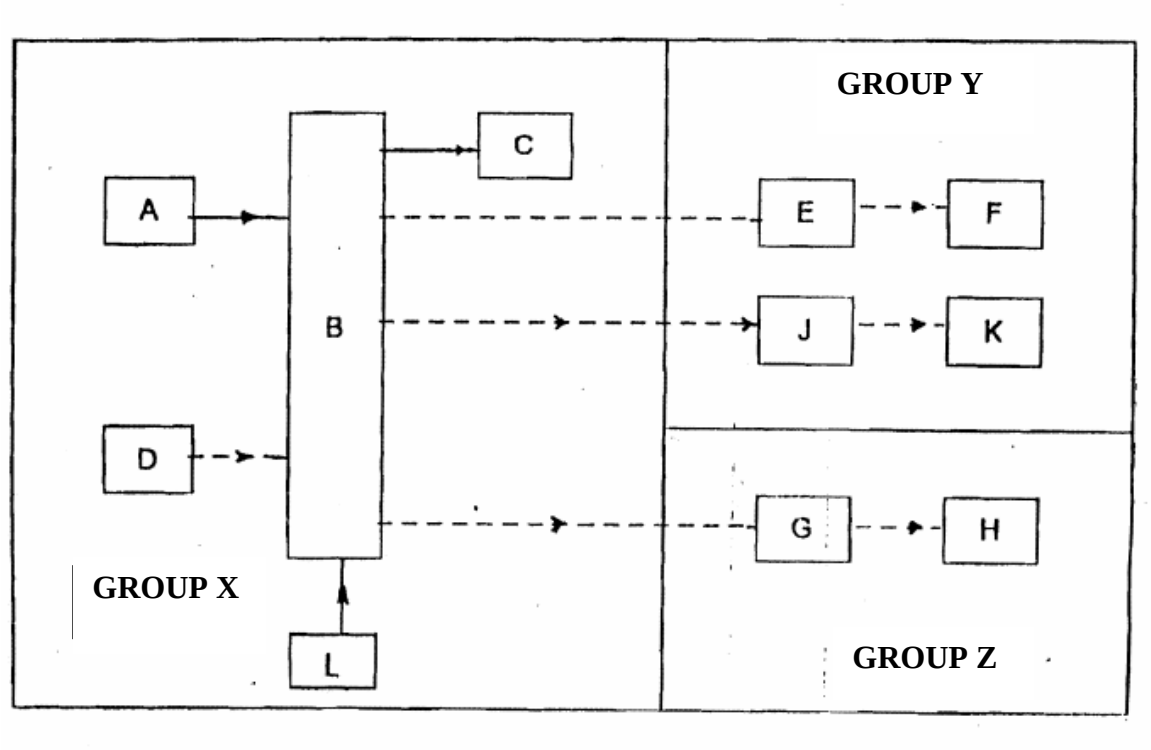


**Figure 1: Fire detection and alarm system**

**Key:**

| | | | |
|---|---|---|---|
| A | Fire detector | G | Control for automatic fire protection equipment |
| B | Control and indicating equipment | H | Automatic fire protection equipment |
| C | Fire alarm signalling device | J | Fault warning routing equipment |
| D | Manual call point | K | F ault warning receiving station |
| E | Fire alarm routing equipment | L | Power supply |
| F | Fire alarm receiving station | | |

**NOTE:** Transmission and reception of fire alarm fault signals and fault warning from protected premises may be provided over a common communication channel (i.e. items E and J, and F and K, may be combined).

The significance of the outlines is as follow:

———— equipment and connection elements that are always present in an automatic fire detection and alarm systems.

– – – – – – – equipment and connection elements that may sometimes be present in an automatic fire detection and alarm system

Group X: Equipment required for local warning.

Group Y: Additional equipment required for external aid.

Group Z: Additional equipment required for local automatic fire protection equipment.

**3.3.1. Heat detector:**

Detector sensitive to abnormal temperature and/or rate of temperature rise and/or temperature differences.

**3.3.2. Smoke detector:**

Detector sensitive to particles of solid or liquid products of combustion and/or pyrolysis suspended in the atmosphere.

Smoke detector can be divided as follows:

**3.3.2.1 Ionization smoke detector:**

Detector sensitive to combustion products capable of affecting ionization currents within the detector.

**3.3.2.2. Photoelectric smoke detector:**

Detector sensitive to combustion products capable of affecting the absorption or scattering of radiation in the infrared, visible and/or ultraviolet region of the electromagnetic spectrum

**3.3.3 Gas-sensing fire detector:**

Detector sensitive to gaseous products of combustion and/or thermal decomposition

**3.3.4. Flame detector:**

Detector which responds to the radiation emitted by flames

**3.3.5. Combination detector:**

Detector combining two or more detecting principles in a single housing

Fire detectors can also be defined as checked phenomenon as in 3.3.6 to 3.3.8.

**3.3.6. Static detector:**

Detector which initiates an alarm when the magnitude of the measured phenomenon exceeds a static or fixed value for a specified period of time

**3.3.7. Differential detector:**

Detector which initiates an alarm when the difference (normally small) in the magnitudes of the measured phenomenon at two or more places exceeds a certain value for a specified time

**3.3.8. Rate of rise detector (rising rate):**

Detector which initiates an alarm when the rate of change of the measured phenomenon with time exceeds a certain value for a specified time

Detectors can be also defined according to shape of sensor as in 3.3.9 to 3.3.11.

**3.3.9. Point detector:**

Detector that responds to the phenomenon monitored in the vicinity of a compact sensor

**3.3.10. Multipoint detector:**

Detector that responds to the phenomenon monitored in the vicinity of more than one compact sensor, such as thermocouples.

**3.3.11. Line detector:**

Detector that responds to the phenomenon monitored in the vicinity of a continuous line

Detector can be also defined in accordance with the stop or not or how to stop after working as in 3.3.12 to 3.3.13.2.

**3.3.12. Resettable detector:**

Detector which after response and on cessation of the conditions that caused the response, may be restored from its alarm state to its normal state of readiness to detect, without the renewal of any component.

Resettable detector can be divided as follows:

**3.3.12.1. Self-resetting detector (self restoring):**

Resettable detector that will automatically restore itself to its normal state of readiness to detect.

**3.3.12.2. Remotely resettable (restorable)detector:**

Resettable detector that can be restored to its normal state of readiness to detect by an operation carried out remotely from the detector

**3.3.12.3. Locally resettable (restorable)detector:**

Resettable detector that can be restored to its normal state of readiness to detect by a manual operation carried out at the detector.

**3.3.13. Non-resettable (unrestorable) detector:**

Detector which after response requires replacement or renewal of one or more component before it can be restored to its normal state of readiness to detect.

Non-resettable detector can be divided as follows:

**3.3.13.1. Non-resettable (unrestorable) detector with exchangeable elements:**

Detector which after response requires the renewal of a component or components to restore it to its normal state of readiness to detect.

**3.3.13.2 non-resettable (unrestorable) detector without exchangeable elements:**

Detector which after response cannot be restored from its alarm state to its normal state of readiness to detect, and must be replaced.

Detectors can be also defined as the ability of removal of detector for maintenance and preservation as in 3.3.14 and 3.3.15.

**3.3.14. Detachable detector:**

Detector designed to be easily removed from its normal operating position for maintenance and servicing process.

**3.3.15. Non-detachable detector:**

Detector not designed to be easily removed from its normal operating position for maintenance and servicing process.

Detectors were defined as signal transmitted as in 3.3.16 to 3.3.18.

**3.3.16. Two-state detector:**

Detector which gives one of two output states relating to either "normal" condition or "fire alarm" condition.

**3.3.17. Multistate detector:**

Detector which gives one of a limited number (greater than two) of output states relating to a "normal" condition or "a fire alarm" condition and other abnormal conditions.

**3.3.18. Analogue detector (signal reproduction):**

Detector which gives an output signal representing the value of the sensed phenomenon. This may be a true analogue signal or a digitally encoded equivalent of the sensed value. This detector does not itself make a decision of fire alarm.

**3.4. Control and indicating equipment (See Figure 1, item B):**

Equipment through which detectors can be supplied with power and which:

a) is used to accept a detection signal and to activate a fire alarm signal and which may also be required to indicate the location of the fire and to record any of this information;

b) if required, is able to pass on the fire detection signal through fire alarm routing equipment (see Figure 1, item E) to, for example, the fire fighting service or, through the control for automatic fire protection equipment (see Figure 1, item G), to, for example an automatic extinguishing installation;

c) is used to automatically supervise the correct function of the system and give audible and visible warning of specified faults.

**3.5. Fire alarm signalling device (See Figure 1, item C):**

Equipment, not incorporated in the control and indicating equipment (see Figure 1, item B) which is used to give a warning of fire, e.g. audible sounder or visual signalling device

**3.6. Manual call point (See Figure 1, item D):**

Device for the manual initiation of an alarm

**3.7. Fire alarm routing equipment (See Figure 1, item E):**

intermediate equipment which routes an alarm signal from the control and indicating equipment (see Figure 1, item B) to a fire alarm receiving station (see Figure 1, item F)

**3.8. Fire alarm receiving station (See Figure 1, item F):**

Centre, on or remote from the protected premises, from which the necessary fire protection or firefighting measures can be initiated at any time on receipt of a fire alarm signal.

**3.9. Control for automatic fire protection equipment (See Figure 1, item G):**

Automatic device used to actuate automatic fire protection equipment (see Figure 1, item H) after receiving a signal from the control and indicating equipment.

**3.10. Automatic fire protection equipment (See Figure 1, item H):**

Fire control or firefighting equipment e.g. control of smoke doors, dampers, fans or an automatic extinguishing installation.

**3.11. Fault warning routing equipment (See Figure 1, item J):**

Intermediate equipment which routes a fault warning from the control and indicating equipment (see Figure 1, item B) to a fault warning receiving station (see Figure 1, item K).

**3.12. Fault warning receiving station (See Figure 1, item K):**

Centre from which the necessary corrective measures can be initiated on receipt of a fault signal.

**3.13. Power supply (See Figure 1, item L):**

Source of power for the control and indicating equipment (see Figure 1, item B) and for those items fed with power from the control and indicating equipment. The power supply (see Figure 1, item L) may include multiple power supplies (e.g. electricity from mains and standby sources).

**3.14. Connection elements:**

Those elements which form the links between the components of a fire detection and alarm system were defined in 3.3 to 3.13.

**3.15. Signals:**

Signals and indicators of fire within the system were defined in 3.15.2 to 3.15.3.

**3.15.1. Detection signal:**

Signal from a detection device (see Figure 1, item A) to show that a fire has been detected

**3.15.2. Alarm indication:**

Indication (at the indicating equipment, see Figure 1, item B) to show that a detection signal has been received.

**3.15.3. Fire alarm signal:**

Signal, which may be electrical, mechanical, audible, visual, etc. to show that a hazard from fire exists in an area. The signal may be local, addressed to the occupants of the area, or remote, addressed to other people or organizations from whom assistance may be required.

**4. Components of fire detection and alarm systems.**

The various possible components (items A to L) listed in Figure 1 may be combined in different ways to meet the requirements of individual installations. For example a system may be brought into operation either by a manual call point D or a fire detector A or by both. Similarly the fire alarm signal may be transmitted to a remote location such as a fire alarm receiving station F or may be limited to fire alarm signalling devices C giving warning on the premises. Additionally a system may initiate the operation of local automatic fire protection equipment H.

**5. Test determination.**

Components of automatic fire detection systems should comply with the appropriate parts of this standard.

Detectors that do not include a decision-making element (see 3.3.18) can also be considered to comply with the appropriate part of this standard when used in conjunction with that part of the system which includes the decision-making element.