



# **WHAT FSM NEED KNOW ABOUT SS645 : 2019**

## ***Installation and Servicing of Electrical Fire Alarm Systems***

***(formerly CP10 : 2005 )***

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# TIME LINE FOR SS 645:2019

- **Launch by Enterprise Singapore (ESG) on 29 August 2019**
- **SCDF Implementation: 1 April 2020**

# CONTENTS

**Clause 1, 2 & 3 :** Scope, Normative references and Terms and definitions

**Clause 4 :** General requirements

**Clause 5 :** Design considerations

**Clause 6 :** Installation, Operation and maintenance

**Annexes :** A, B, C, D & E

**Tables :** 1, A1 & D1

**Figures :** 1 to 12, A1, C1-2 & D1-3

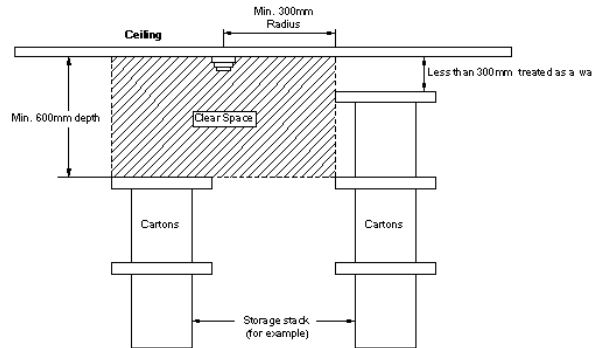


# CLAUSE 4 – GENERAL REQUIREMENTS

## 4.2.2 Clearance requirements

(a) A minimum **clearance of 1000mm** shall be maintained from the **front of the alarm panel's enclosure**.

(b) A clear space of at least **300 mm radius, to a depth of 600 mm**, measured from the detector shall be maintained. No goods or materials shall be placed within the area.



## CLAUSE 4 – GENERAL REQUIREMENTS

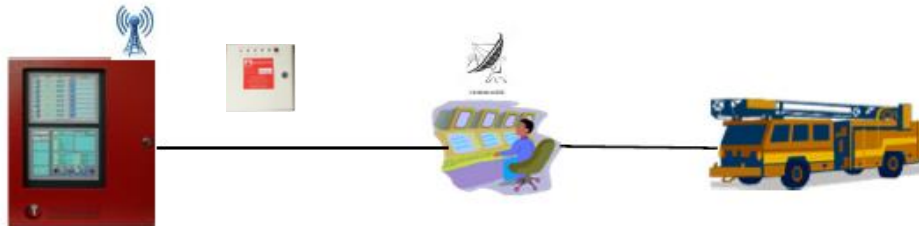


### 4.5.1 Fire service signalling transmitter

- (a) Transmission of signal via leased-line or wireless system which serves as primary;
- (b) Alternative transmission path via direct exchange telephone line or wireless which serves as back up;

### 4.6 Requirements for alarm monitoring station

- (a) All the fire and fault alarm signals shall be promptly and accurately verified with its subscribers when triggered. The relevant authority shall be informed of the nature of the alarm as soon as possible, and not exceeding 2 minutes from the trigger of the fire alarm.
- (b) Records shall be retained at least 1 year.

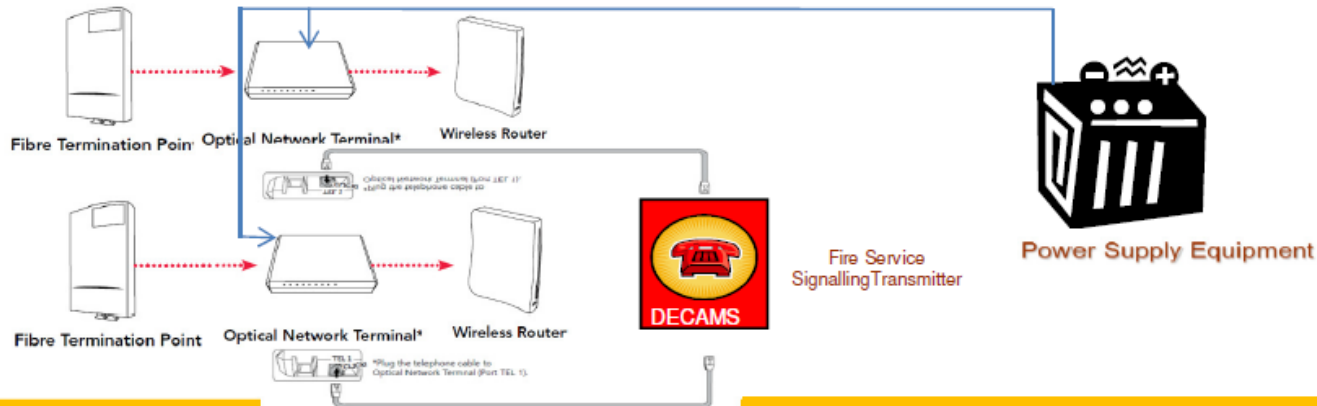


## CLAUSE 4 – GENERAL REQUIREMENTS

### 4.5.3 Where the same means of wireless transmission is used for primary and backup, different service providers shall be used

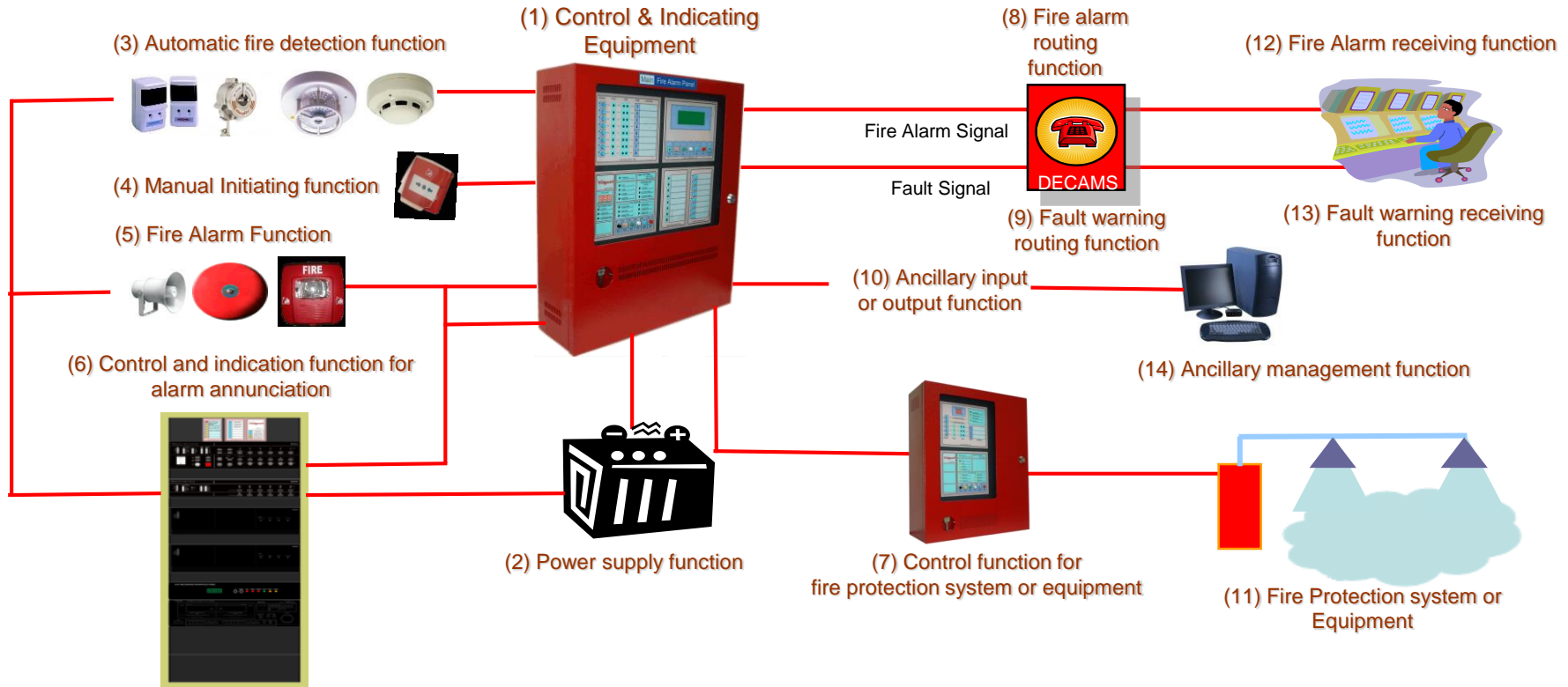
Where the fibre optics (FO) are used for the leased-line and/or back up line, backup supplies for at least 24 hrs to fibre optics equipment shall be provided.

In the event that fibre optics (FO) are used for the leased-line and back up line, two independent FO line with independent fibre optics equipment for lease line and back up line to be connected independently shall be provided.



# CLAUSE 5 – DESIGN CONSIDERATIONS

## Annex A - Fire alarm System and associated systems, functions and equipment



# CLAUSE 5 – DESIGN CONSIDERATIONS

## 5.1.5 Fire alarm management equipment

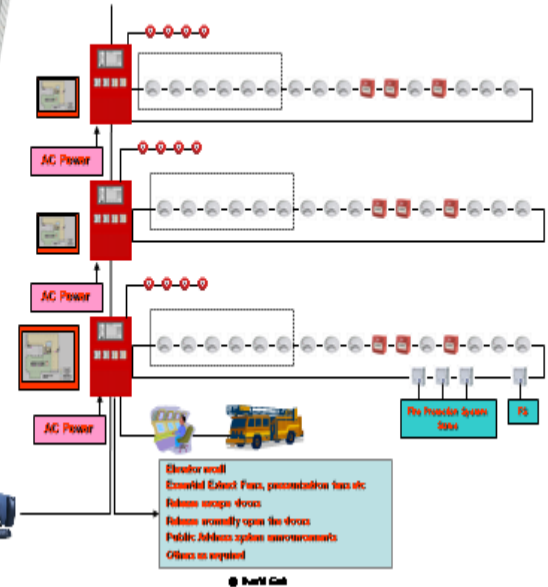
Where a **fire alarm management system or equipment** is installed and **connected** to the fire alarm system for remote access and monitoring, the **fire alarm system** shall be capable of **operating independently at all time** such that the operation and **malfunction of the fire alarm management system or equipment** shall **not in any way affect the performance** of the fire alarm system specified in this code, particularly the control function for all the fire protection systems and equipment

Fire alarm management equipment



2. Types of Fire Alarm Systems in use today

Typical Addressable Fire Alarm System Configuration





# CLAUSE 5 – DESIGN CONSIDERATIONS

## 5.2.2 Zone plan / mimic panel

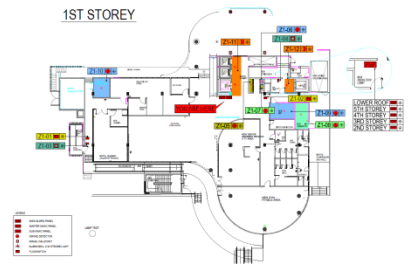
A **zone plan** shall be **provided at each main/sub/repeater alarm panel location**

**Zone plans provided shall be securely mounted and easily accessible. The plan shall be in the form of a permanent diagram that is water resistant and fade resistant. The lettering shall be a minimum of 3mm and shall include the following information (where applicable):**

- (a) **The layout of the building in which the Fire Alarm System is installed**
- (b) **The area covered by each zone**
- (c) **The location of MAP and SAP and marked “YOU ARE HERE”**
- (d) **The location of special hazards control panel, fire fan control panel and emergency voice communication control station.**
- (e) **The location of any fire suppression system controls.**
- (f) **The location of the building’s main electrical switchboard.**
- (g) **The year of original installation and the date of the latest revision to the zone plan.**

**The zone plan/mimic panel shall be installed in accordance with its floor or building orientation.**

The locations of all **other fire fighting facilities** such as landing valves, hosereels and fire extinguishers etc. **may be included** in the zone plan.



## CLAUSE 5 – DESIGN CONSIDERATIONS

### 5.2.4 Fire alarm panel cabinet

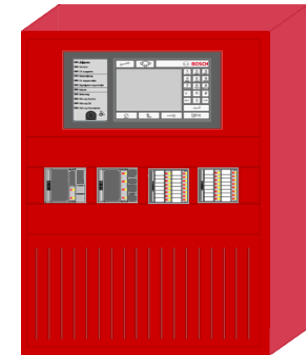
- (a) The cabinet shall be **red** and of **robust** construction with a **lockable front** panel. A **glass-fronted box** shall be provided to **house the key** for unlocking the fire alarm panel cabinet. Such key shall be located **next to the cabinet or as part of the cabinet**. The properties of the glass of the glass-fronted box shall be such that it is easily breakable and will shatter without the need to use any special tools.  
**Lockable front panel is not required in Fire Command Centre.**



OR



OR



FCC

# CLAUSE 5 – DESIGN CONSIDERATIONS



## 5.2.11 Records

The following information shall be recorded in the log record:

- (a) The **name(s)** of the member(s) of the premises management to whom **responsibility** for the fire detection and fire alarm system is delegated;
- (b) **Brief details of maintenance arrangements**;
- (c) **Dates and times of all fire alarm signals** (regardless of whether the signal is a **false alarm** or is initiated as the **result of a test, fire drill or genuine fire**); if the fire alarm signal has resulted from the operation of a manual call point or fire detector, the device and its location shall be recorded;
- (d) **Causes, circumstances surrounding and category of all false alarms** (see 6.3);
- (e) **Dates, times and types of all tests**;
- (f) **Dates, times and types of all faults and detectors**;
- (g) **Dates and types of all maintenance** (e.g. service visit or non-routine attention).



For post-investigation purposes, all **log records** shall be kept for the **minimum of 12 months**.

A recommended format of the log record is described in **Annex B**.

## CLAUSE 5 – DESIGN CONSIDERATIONS

### 5.5.7 Fire alarm acknowledgement



If a building does not have an approved emergency voice communication system complying with SS 546, whenever the fire alarm system enters a new fire alarm condition, only the first alarm audio and visual devices shall be permitted to be deactivated after 3 minutes and any subsequent alarms may be deactivated immediately. An appropriate instruction shall be provided for this function.

Where a building is provided with an approved emergency voice communication system complying with SS 546, the following 5.5.8 shall comply. In this case when the audio and visual alarms are deactivated (after min. 15 sec), a recorded voice message shall automatically or manually be activated to inform the occupants in the building of the alarm. When the message is announced, any subsequent alarms shall not activate the audio and visual alarm devices. The visual devices shall only be activated when an evacuation/emergency message is announced. A yellow visible indication shall be shown when the audio and visual devices are deactivated at the front of the main and sub alarm panel.



# CLAUSE 5 – DESIGN CONSIDERATIONS

## 5.5.8 Interface with the emergency voice communication (EVC) system



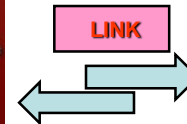
If the fire alarm system and EVC are linked and an emergency announcement has been initiated automatically from the fire alarm system or manually, it shall continue until overridden by a higher priority announcement initiated from the fire alarm system or manually from the EVC system.



In the event of subsequent alarms activation from other zone, the first emergency announcement shall be replaced by a higher priority or evacuation announcement initiated from the fire alarm system or manually from the EVC system.



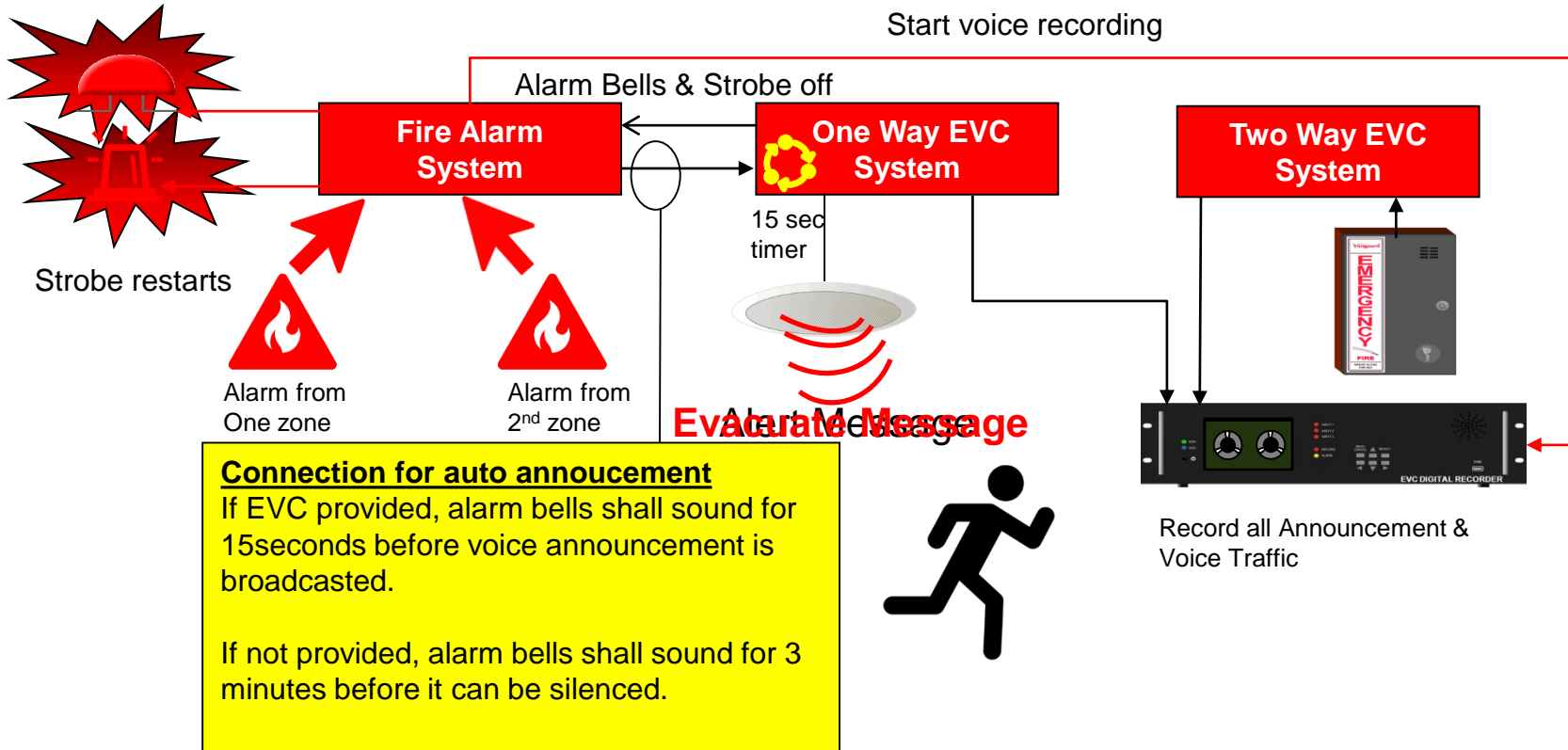
When an emergency announcement has been initiated automatically from the fire alarm system, the first emergency announcement shall be replaced by a higher priority announcement or an evacuation announcement, to be initiated from the EVC system after maximum 2 minutes of first announcement and no manual acknowledgement by the building operators.





# CLAUSE 5 – DESIGN CONSIDERATIONS

## 5.5.8 Interface with EVC system - Fire Alarm & Messages (Two Zone Alarm)



## ADDITIONAL DUTIES REQUIRED OF FSMs – COVID-19 Safe Management

### a. No locking or chaining up of exits

The **locking of exits is not permissible at all times** as it constitutes a fire hazard and will **compromise the means of escape** for the occupants. If **physical barriers are used** as part of COVID-19 safe management measures to prevent access to the entry/exit points, these **must be easily removable** to facilitate evacuation in an emergency.

### b. Placement of signage

**Notices or signage** should be **placed prominently at the exits** to inform members of public that the **barriers can be removed and exits** can be used readily for **evacuation during emergency**. As a guide, the following template message can be printed and placed at the emergency exits – **“In the event of an emergency, please remove this barrier and use this exit for evacuation.”**

### c. Public Announcement (“PA”) message

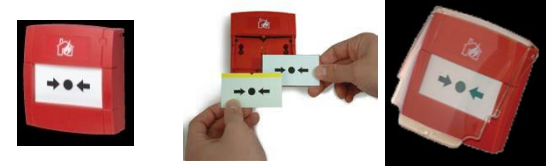
In a **fire emergency**, SCDF requires a **PA message** to be made via the emergency voice communication (EVC) system **informing members of public that all exits can be used for evacuation**. This message can be made **live or pre-recorded**. FSMs are to conduct **regular tests** on the functionality of their premises’ EVC system to ensure that message can be **broadcasted effectively**. When any message is announced, the **alarm bell shall not be sounded or ringing** at the same time to ensure that the **message can be heard clearly**.

Note: To include all the above in the ERP



# CLAUSE 5 – DESIGN CONSIDERATIONS

## 5.6 Manual call point



### 5.6.2 Manual call point

Manual call point shall be bright red in colour and shall be of the “**break glass**” or **resettable flexible elements type**.

**NOTE** – A resettable flexible element can be **returned to its original position without replacement**, in order for the manual call point to be able to return to the normal condition.

### 5.6.6 Location

Manual call points shall be located between **800mm and 1200mm** above the finished floor level and shall be easily accessible and conspicuous position free from obstructions.

In areas where manual call points are likely to be subjected to casual, malicious operation or accidental damage, manual **call point with transparent hinged cover is acceptable**. Operation of this **two-action** manual call point then involves lifting the cover and operating the manual call point in the normal manner.

## CLAUSE 6 – INSTALLATION, OPERATION AND MAINTENANCE

### 6.1.8 False Alarms for new installation (new sub clause)

During commissioning, a check shall be carried out to ensure that there is no obvious potential for false alarms. The completion of the check shall be recorded on the commissioning report along with any potential false alarm problems that should be subject to further consideration at the time of future service visits.



# CLAUSE 6 – INSTALLATION, OPERATION AND MAINTENANCE

## 6.2 Operations

The owner shall appoint a **competent person** to supervise and coordinate all matters in relation to the fire alarm systems. The person should be **trained in operating the fire alarm system effectively.**

When a **signal is announced on the fire alarm panels, fire or non-fire, the person should be capable of analysing and interpreting the signal correctly and taking appropriate actions.**

In a **false alarm or other fault annunciation, the source of the false alarm or fault signal shall be made available in a log record. Recommendations to prevent recurrence of such events should also be included in the log record. The person shall also be responsible for keeping all the log records on routine preventive maintenance, repair and alteration works carried out on the systems. (see Annex B)**



### Weekly / monthly / annual test report

OWNER: \_\_\_\_\_  
 LOCATION: \_\_\_\_\_ TIME: \_\_\_\_\_  
 TYPE OF TEST: WEEKLY/MONTHLY/ANNUAL\* DATE: \_\_\_\_\_

ALARM ZONE NUMBER		ALARM TEST							
DEVICES*	HEAT DETECTOR	ALARM TEST							
		ISOLATION							
		FAULT TEST							
	SMOKE DETECTOR	ALARM TEST							
		ISOLATION							
		FAULT TEST							
POWER SUPPLY*	MAN SUPPLY	ALARM TEST							
	CHARGER	ALARM TEST							
	BATTERY	ALARM TEST							
ALARM MONITORING STATION	FAULT TEST								
ALARMS* AND ANCILLARY	AUDIBLE ALARM SOUNDER								
	VISUAL ALARM IN THE ANCILLARY CONTROL								

OPERATIVE      NON OPERATIVE      REMARKS

REMARKS: \_\_\_\_\_  
 I HEREBY CERTIFY THAT THE ABOVE TESTS HAVE BEEN CARRIED OUT

Tester's Name: \_\_\_\_\_  
 Signature: \_\_\_\_\_  
 Owner's Name: \_\_\_\_\_  
 Signature: \_\_\_\_\_

\* Delete if not applicable  
 \* Tick if satisfactory; 'x' if unsatisfactory and provide details in the remarks box



### Event log for fire alarm system

False Alarms									
Date	Time	Zone # <sup>a</sup>	Device # <sup>b</sup>	Device # <sup>b</sup>	Initials	Other completed # <sup>c</sup>	Action required # <sup>d</sup>	Further actions required # <sup>e</sup>	Signature

a) For repeated test, fire alarm signal, fault #<sup>c</sup> Where no signal is announced, record details in this area #<sup>d</sup> Where no signal is announced, record details in this area #<sup>e</sup> Where applicable

Maintenance Work									
Date	Time	Zone # <sup>a</sup>	Device # <sup>b</sup>	Reason for work	Work carried out	Further work required	Signature		

#<sup>a</sup> Where no signal is announced, record details in this area #<sup>b</sup> Where no signal is announced, record details in this area #<sup>c</sup> Where applicable

# CLAUSE 6 – INSTALLATION, OPERATION AND MAINTENANCE

## 6.2 Operations - Event Log Record – Kept for minimum of 12 Months

Events other than false alarms or maintenance work

Date	Time	Event <sup>A)</sup>	Zone <sup>B)</sup>	Device <sup>B)</sup>	Action required <sup>B)</sup>	Date completed <sup>B)</sup>	Initials

<sup>A)</sup> For example test, fire alarm signal, fault  
<sup>B)</sup> Where applicable

False alarms

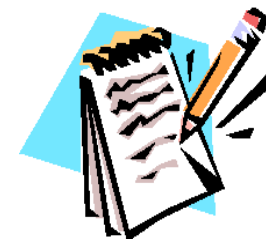
Date	Time	Zone	Device that Triggered alarm signal	Cause (if known)	Brief circumstances <sup>A)</sup>	Maintenance visit required? (Yes/No)	Findings of maintenance technician <sup>B)</sup>	Category of false alarm	Further actions required <sup>B)</sup>	Action completed <sup>B)</sup>

<sup>A)</sup> Where cause is unknown, record activities in this area  
<sup>B)</sup> Where applicable

Maintenance Work

Date	Time	Zone <sup>A)</sup>	Device <sup>A)</sup>	Reason for work	Work carried out	Further work required	Signature

<sup>A)</sup>Where applicable



Event Log for Fire Alarm System

# CLAUSE 6 – INSTALLATION, OPERATION AND MAINTENANCE

## 6.3 Maintenance

### 6.3.1 General

The arrangements for maintenance **with or without service contract** shall be such as will ensure that a **competent person is available on call at all times** to provide service in the event of any fault that develops at the installation.

### 6.3.2 Limitation of false alarms (new sub-clause)

It is a common **misconception** that **most false alarms arise from faults in equipment**. In fact, **most false alarms arise from a combination of environment influences, fire-like phenomena, inappropriate action by people in the building and accidental damage**.

False alarms can be **categorised** into the followings:

- (a) **Unwanted alarms** - inappropriate action by people in the building and accidental damage.
- (b) **Equipment false alarms** – arising from malfunction of equipment.
- (c) **Malicious false alarms** – arising from malicious action.
- (d) **False alarms with good intent** – involving genuine belief by a person that there is a fire.



**Note -** It should not be assumed that, in the absence of other information, a false alarm needs to have arisen from an equipment fault.



## 6.3 Maintenance

### 6.3.2.2 Preventive maintenance (new sub-clause)



The number of false alarms that can be anticipated is virtually proportional to the number of automatic fire detectors installed. The constant of proportionality will normally be highest where the fire detectors are smoke detectors. Systems incorporating only manual call points or manual call points in conjunction with heat detectors do not normally produce many false alarms.

Smoke detection systems with signal processing incorporating techniques specifically intended to discriminate between certain unwanted alarms and real fires, are likely to offer better immunity to false alarms.

Systems with pre-alarm warning feature enable investigation of conditions that would lead to an unwanted alarm if no action is taken.

Owner's representative, competent contractor or servicing organisation shall inspect the signal processing data available from the smoke detection systems regularly and investigate any pre-alarm warning.

For smoke detection systems without signal processing, regular cleaning or replacement of smoke detectors is necessary.



## CLAUSE 6 – INSTALLATION, OPERATION AND MAINTENANCE

### Preventive Maintenance

#### Current analog values

Optical system value (display of the current contamination value):

0 . . . 170	Initial set-up value for a new detector
0 . . . 350	Normal working range
350 . . . 450	Slight contamination: Exchange detector soon
450 . . . 510	Heavy contamination: Exchange detector immediately
From 511 O fault:	optical sensor is deactivated!

#### Contamination

The optical initial set-up value of a new detector is stored in the integrated EEPROM during the final inspection. The contamination value specifies by how much this analog value has increased in comparison with the delivery state.

# SECTION THREE – INSTALLATION, OPERATION AND MAINTENANCE

## 6.3 Maintenance

### Preventive Maintenance

Sprinkler/Flow Switches

- use flow switch with Timer Delay



Call Point

- additional hinged cover



Heat Detectors

- Mechanical type  
Fixed Temperature  
Heat Detectors



Flame Detectors

- Triple Infra Red





# CLAUSE 6 – INSTALLATION, OPERATION AND MAINTENANCE

## 6.3 Maintenance

### 6.3.3.1 General

Where the **heat-sensitive element of thermal detectors or the enclosure of other detectors** are found to be **coated with paint or any other material likely to affect the operation of the detectors**, such material shall be **cleaned off** or if necessary, have the detector **replaced**.

### 6.3.3.4 Monthly

- (a) Simulate fire and fault condition **at the manual call points and detectors** on all alarm zones to ensure it is operational. Confirm with the monitoring station that the fire alarm and fault signals have been received.



### 6.3.3.5 Annual

- (a) The maintenance personnel should arrange to check the operation of at least 20 percent **of the manual call points** and detectors in an installation each year. The selection of manual call points and detectors to be tested should be spread over as many zones as possible and should be made in such a way that all manual call points and detectors in an installation should have been checked at least once in 5 years.

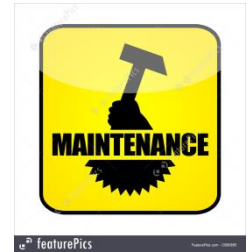
The checking of the **manual call points** and detectors should take the form of in situ testing to ensure it is operational.

# CLAUSE 6 – INSTALLATION, OPERATION AND MAINTENANCE

## 6.4 Operation and maintenance manuals and “as installed” drawings

Operation and maintenance manuals and “as installed” drawings of the complete installation including the following:

- (i) A single-line diagram of the system
- (ii) The fire alarm panel layout
- (iii) The positions of the detectors and alarm zones
- (iv) The relevant information of the technology of the fire detection and alarm system



should be provided to the user before a final inspection is made.



# Thank you



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