

**CFPA**EUROPE®

GUIDELINES

SC Doc-No 21005

# ARSON DOCUMENT





## **Foreword**

The Security Commission of CFPA Europe has developed common guidelines in order to achieve similar interpretation in the European countries and to give examples of acceptable solutions, concepts and models. CFPA Europe has the aim to facilitate and support fire protection, security and protection against natural hazards across Europe.

The market imposes new demands for quality and safety. Today, fire protection, security and protection against natural hazards form an integral part of a modern strategy for survival and competitiveness.

These Guidelines are primarily intended for the public. They are also aimed at rescue services, consultants, safety companies and the like so that, in the course of their work, they may be able to help manage risk in society.

These Guidelines have been compiled by the Security Commission and are adopted by all members of CFPA Europe.

These Guidelines reflect best practice developed by the national members of CFPA Europe. Where these Guidelines and national requirements conflict, national requirements shall apply.

## Content

<b>1</b>	<b>Introduction</b> .....	<b>4</b>
<b>2</b>	<b>Facts about arson</b> .....	<b>4</b>
2.1	Background on arson .....	4
2.2	Effects of arson .....	4
2.3	Arson – consequences for companies .....	6
<b>3</b>	<b>Factors behind arson</b> .....	<b>6</b>
3.1	Motivation of arsonist .....	6
3.2	Factors that indicate intent .....	7
3.3	Different kinds of arson .....	7
<b>4</b>	<b>Risk management</b> .....	<b>10</b>
4.1	Assessing the risk of arson .....	10
4.2	Rating point on arson risks and measures .....	11
4.3	Rating points on security risks and measures .....	12
<b>5</b>	<b>Prevention of arson</b> .....	<b>14</b>
5.1	Development areas concerning arson prevention .....	14
5.2	Information about arson for young people.....	15
5.3	Security as part of management responsibility.....	15
5.4	Arson by employees.....	16
<b>6</b>	<b>Measures to prevent arson</b> .....	<b>18</b>
6.1	Security measures.....	18
6.2	Organisational methods .....	19
6.3	Security equipment and systems .....	22
6.4	Surveillance systems.....	24
6.5	Open space surveillance (perimeter surveillance) .....	26
6.6	Fire protection equipment for control of arson.....	26
<b>7</b>	<b>Arson investigation</b> .....	<b>31</b>
7.1	Reacting on an incident.....	31
7.2	Co-operation and role of police and fire department .....	32
<b>8</b>	<b>Conclusion</b> .....	<b>32</b>
<b>9</b>	<b>Bibliography</b> .....	<b>33</b>

# 1 Introduction

This document provides background information and practical guidance on the prevention and control of arson.

This revision of the Arson Document includes the former CFPA-E-Guidelines No 01 : 2010/S Arson Document.

It is provided for the use of managements of all enterprises in industry, commerce and the public sector and will also be of interest to government departments, local government organisations, police, fire brigades, insurers, and research bodies.

Arson is fire affecting the premises caused by the malicious act of a human being. This European guidance document is concerned with the prevention and control of fires which are begun deliberately. However, planning against deliberate fires needs to be part of management's overall safety policy to protect people and property against fires in general; equally it forms part of the management's overall strategy for dealing with security threats of all kinds.

The document is published by the various member countries of CFPA Europe in their respective languages.

## 2 Facts about arson

### 2.1 Background on arson

In most developed industrial countries arson has become a serious fire problem of our time. While fire statistics in general and arson statistics in particular are inadequate to a lesser or greater degree in a lot of countries it has been clearly established that worldwide the cost of arson as a proportion of all fire costs may be very high depending on the country. Insurers throughout the world are spending a lot for losses resulting from arson. An alarming increase in the number of deliberately started fires, as reflected in the criminal statistics of all industrial countries, has been noted. An important point about fire begun deliberately is that not only has the number of such fires increased enormously but that the cost of such fires is much higher than with accidental fires – the reason being that deliberate fires are often begun in more than one place, that accelerants are used and that fire protection equipment is interfered with.

It is clear from studies which have been made that no type of building is immune from arson attack but some buildings are far more prone to arson attack than others. Targets which have been identified as particularly at risk include domestic dwellings, schools, cultural historic sites such as churches, warehouse and storage premises, shops, hotels and restaurants, construction sites, hospitals, farm building, factories. Vehicles are also greatly at risk from arsonists, especially when a vehicle has been used for other criminal activities.

Arson is one manifestation of criminal damage, as it is causing damage to property or destroying property using other means. In addition to causing damage to property, arson is one form of aggressive behaviour. Therefore, lighting a fire is one way of endangering the lives and health of other people. There is great variation in the criminal histories of persons guilty of aggravated criminal damage and criminal mischief involving fire. Persons of various ages light fires as vandalism or revenge, as a result of an impulsive emotional charge or in order to release negative emotions. Lighting fires can have an emotional meaning, but instrumental use stands out – fire is used as a tool or a means to achieve some specific objective.

### 2.2 Effects of arson

All losses that arson can cause should not be only be thought of as property loss, but be more widely considered as a life safety issue. In addition, a high proportion of organisations that suffer a fire (however it starts) do not reopen for business. An effective arson prevention strategy is therefore necessary not only to protect life and property but also to ensure the continued smooth-running of business operations.

Arson is a very costly crime. In addition to direct losses there will also be an element of business interruption and the cost of any death or injury is, of course, impossible to estimate in financial terms.

Arson can be a threat of all kinds and it can cause:

- loss of life and injuries
- material damage
- enormous financial losses
- business interruption
- loss of goodwill among customers and suppliers
- damage to the environment
- loss of heritage buildings
- inconvenience and loss of amenities for the community
- huge destruction of wildland and rural areas

Arson fires tend to be much more costly than accidental fires because:

- There are often multiple seats of fire lit to ensure that a serious blaze occurs.
- The fires may be assisted with flammable liquids.
- The fires may be lit at vulnerable points in a building.
- They are lit at night or at other times when few people are about and thus there is a delay in calling the fire brigade.

In many businesses, it is not just the flames that put a halt to normal business routines but the spread of smoke, toxic gases and the pungent smell. In premises there may be electronic data processing equipment, sensitive machine tools or stocks of fabrics or food that are totally unusable and will need cleaning, repair or disposal and replacement before normal business operations can resume.

Unsolved series of arson fires cause insecurity and concern in communities. Claimed damages can be so high that the remainder of the offender's life may be impacted by the consequences of lighting a fire. Combustion is not the only cause of danger or damage, but fire gases and smoke may cause significant property damage and health hazards.

Fires that have been lit deliberately entail costs for fire and rescue services, the police, health care services, the judicial system and insurance companies. They may be treated differently as fires started by accident (as the fighting techniques could differ).

Housing companies and property owners insure costs due to prevention and protection measures taken against arson and other criminal damage. It is difficult to quantify the cost of these preventive measures and the costs incurred as a result of fires, and not all human suffering, such as personal injuries or the sentimental value of property, can be measured in monetary terms.

Fires that have been lit deliberately may be treated differently as other fires that start by accident (the fighting techniques could differ).

Fires lit deliberately may cause greater property loss. This is because deliberate fires may be:

- lit using multiple points of ignition
- lit at vulnerable points in the building
- assisted by the use of flammable liquids or other accelerants
- started at a time when there will be a delay in the fire being discovered (such as when the premises are unattended or only partially occupied)
- assisted by compromising fire protection measures in the building (for example, fire doors may be wedged open to help a fire develop and spread throughout the property), or by the sabotage of automatic fire protection measures (such as by isolating a sprinkler system or automatic fire detection installation)
- an attempt to destroy evidence of another crime

The scale of business disruption following a deliberate fire does not necessarily reflect the amount of damage to the property. For example, a very small fire can have a significant impact on business operations, depending on the vulnerability of machinery, process plant, raw materials and stocks of finished products.

## 2.3 Arson – consequences for companies

The consequences of arson for the company may be divided into three main categories:

**Material consequences:** Direct material damage. These consequences are known and can be directly evaluated and calculated (if a prior and up-to-date valuation of property exists).

This category includes:

- destruction of buildings
- destruction of machines and durable goods
- destruction or deterioration of stores of raw materials and finished products
- destruction of plans and archives
- destruction of wildland and rural area

**Not directly measurable consequences:** We are here concerned with intangible damages, which can however be easily defined, i.e.:

- financial losses, operating losses (business continuity)
- delays in delivery times (leading to penalties)
- loss of market share
- loss of confidence on the part of customers, suppliers, bankers
- tarnishing of corporate image and damage to the company's reputation

**Human consequences:** Apart from the enforced unemployment that may result from arson in a company, the human consequences are generally not well-known and do not attract the attention they deserve. Why is this? Simply because there are no materially visible and measurable damages in the short term.

The effect on people of an act proved to be arson, especially if the arsonist has not been identified, may be catastrophic and long lasting.

The enquiry made after the fire by the police, while obviously necessary, tends to increase the anxiety of people in the affected company.

This may lead to deterioration of human relations, loss of confidence in management and supervisory staff and can sow doubt and suspicion in the minds of all employees.

## 3 Factors behind arson

### 3.1 Motivation of arsonist

There are many different motives for arson although it is felt in most European countries that arson for gain (i.e. to defraud insurers), while a significant factor, accounts for only a small part of the cost. Where evidence has been collected it is seen that much arson is associated with vandalism and other crimes such as burglary. Even younger persons are often the culprits.

The motives for committing arson are many and varied and, in devising countermeasures against arson, the fullest possible understanding of what causes people to start fires is required – by governments, fire, police and other agencies; and by the management of premises in need of protection.

Such information is best obtained from a compilation in each country of arson fires that have occurred and an analysis of the motives of arsonists who have been apprehended and prosecuted. Meanwhile, the information in this chapter, and from other published sources, will be of help to the various agencies and managements in deciding who the arson enemy may be, taking appropriate preventive measures and, in the case of small suspicious fires, perhaps successfully identifying the culprit before a major tragedy occurs.

Arsonists are not always trying to find remote areas in which they could light something on fire when no-one is looking. Potential arsonists may be intruders, visitors, contractors or staff. Research indicates about the characteristic of offenders that people convicted of arson possibly are suffering from various neurological, mental, social and substance abuse problems.

## **3.2 Factors that indicate intent**

Suspicion of intent is aroused based on the circumstances, scene of fire or time of day, or when abnormal factors such as signs of break-in are observed at the scene of fire. In addition, suspicion that a fire was intentional may arouse if the fires seem to indicate a series, that is, similar fires have occurred within a short period of time in the nearby areas

At the scene of fire, there may be persons who have a strong opinion about the fire being intentional, or they are interested in the opinion of the rescue services regarding the cause of the fire, the ignition point or some other details. If the same person is often present at the scene of fire, or an owner is particularly eager to discuss the cause of fire, suspicions concerning intent and the person lighting the fire may be aroused.

The indicators for intent include, for example, the following:

- several ignition points
- no natural cause of fire (uninhabited house, no electricity, etc.)
- unusual ignition point
- smell, the shape of the burnt area, chemical analysis, or a dog reveals the presence of a fire-accelerating substance
- the spreading of fire has been facilitated (e. g. open windows)
- the fire load has been arranged
- personal items are missing
- additional items have been added to the fire load
- unusually rapid fire or unusually high temperature
- fire protection equipment has been tampered with
- ignition tools or timers have been found
- air conditioning has been tampered with to accelerate the spreading of fire
- electrical equipment and other technology in the house or home has been tampered with

## **3.3 Different kinds of arson**

### **3.3.1 Areas where fire occurs**

No location can be considered totally free from arson risk but some neighbourhoods are more vulnerable than others: isolated locations for example; inner city areas subject to unrest, vandalism and rowdy behaviour; premises adjacent to football grounds and other such areas where large crowds gather.

Fires are intentionally lit in places where people typically spend time: in homes, yards, parks and on streets. Wildfires are lit near populated areas or roads. The people who are guilty of arson are not always trying to find remote areas in which they could light something on fire when no-one is looking.

The typical cases of arson indicates that the vandalised objects, and in particular those that have already been the target for an arson fire, are more likely to be subject of arson attacks. With a variety of disturbing elements and malicious or otherwise restless behaviour, there is a greater risk of various types of vandalism- including vandalism involving fire-than in environments with higher tolerance for disorder. Locks and lighting are important for the protection of property, but if a person wants to commit an act of vandalism by lighting something on fire, it is difficult to prevent them and it is easy to fulfil the desire. If a person wants to light a specific site on fire, committing or preventing the act depends, among other things, on who has access to the site, how the site can be supervised and what other options the potential arsonist is offered for solving the situation.

In basics many of the malicious fires are started during the hours of darkness, but this does not mean that premises are safe during daylight hours. Availability of fuels and gases and access to combustible elements of the premises increase the risk of arson.

### **3.3.2 Arson for gain**

This is to:

- defraud insurers
- circumvent planning law (i.e. to destroy a building which is 'protected' so that a new building can be constructed)
- arson of wildland and outside areas (to get free space/land, e. g. for constructing buildings)

Each of the above types of arson may be committed by the individual who himself stands to gain or may be 'contracted out' to another person – the 'torch for hire' syndrome.

### **3.3.3 Arson associated with other criminal acts**

This can be:

- to conceal or cover up a burglary or break-in
- to disguise sabotage
- part of a blackmail attempt
- to cover a murder
- vandalism
- to destroy evidences of former criminal acts It is believed that a substantial number of arson cases are associated in particular with vandalism and with break-ins

### **3.3.4 Arson associated with political or economic motivation**

The desire to destabilise (a company or organisation)

- elimination or weakening of a competitor
- industrial sabotage
- blackmail
- intimidation
- pressure groups
- workers' struggles
- manipulation of crowds
- terrorism

### **3.3.5 Arson associated with 'grievance'**

- revenge against a colleague or head of department (or teacher, etc.)
- jealousy (of colleague's promotion or success)
- conflicts in the company, organisation or with authorities
- salary grievances, lack of advancement in the job, feeling of being unappreciated
- fear of unemployment or company relocation
- failure to be elected to a certain position or committee
- other grievances against the company
- having been humiliated in front of fellow workers
- failure to adapt to changing techniques

It is to this category that management and fire investigators will first look if the cause of a fire is recognised as arson. In many such cases the arsonist is identified, breaks down and confesses. When the arsonist is not identified there can be significant deterioration in human relations and work atmosphere, along with damage to the company's reputation in respect of customers, suppliers, bankers, etc.

### **3.3.6 Arson associated with mental disturbance or instability**

- Revenge
- Hatred

- Jealousy
- Boredom
- Desire to attract attention (arson for heroism)
- Frustration, sexual perversion
- Pyromania
- Vandalism (often associated with alcoholism or dependence on drugs)

In these manifestations, the arsonist is giving vent to his deeper impulses by deliberately starting a fire. Psychiatrists believe that such a person starts a fire as a way of solving personal problems and reducing physical tension.

A pyromaniac is attracted by the spectacle of a large fire and since he does not fear being identified he will not hesitate to commit his criminal act.

In this category come the seekers after thrills, the attention-seekers, the would-be heroes whose impulses may even lead them to apply for work as fire fighters or security guards – sometimes with disastrous results.

Also coming within this category are three other manifestations of arson:

- The cry for help – when the world around seemingly ignores the offender’s problems
- The desire to ‘escape’ – e. g. the patient in a mental hospital wishing to be transferred elsewhere
- Self-destruction (suicide attempts)

### **3.3.7 Arson committed by children and young people**

Arson means deliberately starting a fire in order to destroy. Most fires that are started by children are probably not deliberate but begin as play. If a small child plays with matches (as a toy) and accidentally starts a fire it is clearly not arson. However, studies have shown that even small children as young as 3 or 4 year old have started fires in their homes for revenge or through jealousy directed towards parents or older brothers or sisters.

So far as fire brigade, police and managements are concerned there are many cases on record of young children entering business premises and starting fires; in assessing the risk to any premises the presence in the area of a disproportionately large number of children needs to be taken into account.

The most common motives among children and young people are curiosity, extreme boredom and vandalism. Other motives among both young people and adults are concealment of crime, revenge, hate, conflicts and insurance swindles. There are also many young arsonists that are known to the police or to social workers from earlier incidents. Many of these youngsters have difficulties at school or at home, feel a failure, or have other difficult relationships.

### **3.3.8 Wildfires**

Wildfires are particularly difficult to define. They may have spread from a cigarette that was not properly extinguished, from a smouldering campfire or as a result of other careless use of fire. Fires are many times intentionally lit in places where people typically spend time: in homes, yards, parks and on streets. Wildfires are often lit near populated areas or roads.

In order to limit forest fires, it is important that fires are detected as early as possible. When the fire occurs the danger of wildfires can also be high in the surrounding area and the effects can often be indirect. Forest fires are sudden disturbances that affect ecosystem services and human well-being and can cause property damage and health damage. The most common external sources of forest fires are lightning or human negligence that results in the spread of fire.

Nevertheless wild fires can be started by intend to create free space for differten porposes. The relevance of this may vary considerably from country to country.

*Note: Reference is made to the CFPA-E-Guidelines No 6 : 2016/N Forest Fires.*

### **3.3.9 Vehicle fires**

In vehicle fires, the share of deliberate fires of fires caused by people has remained high. Most vehicle fires are passenger car fires. Cars that have been parked for a long time, including cars that have broken down on the road and cars having no registration plates, are at risk of vandalism

and deliberately lit fires. It is notable that in several vehicle fires, it is not clear who the owner or user of the car is. In these cases, suspicions that there had been an intention to destroy the car on purpose were easily aroused. However, no compensation had been sought for the car, so the case did not meet the criteria for fraud, but it may have fulfilled the criteria for a deliberately lit fire.

Cars that have been abandoned or broken down should be removed faster, because they are prone to vandalism.

### **3.3.10 Deliberately lit fires**

Regarding the sites of deliberately lit fires, it is apparent that the majority of deliberately lit fires involve various types of movable property in very different environments. Many deliberate fires are started by young teenagers; vigilance should therefore be maintained should groups of teenagers congregate in the vicinity of the premises. In the case of deliberately lit fires, the offenders, motives, circumstances and situations constitute a heterogeneous entity.

### **3.3.11 Arson associated with organised crime**

The main elements normally can be:

- associated with previous requests of money, rejected by the proprietors/managers of the building
- arson happen during the night
- nobody is injured
- can be easily interpreted as arson, as arsonists normally want that the proprietors/managers of the building clearly understand the meaning of that particular action.

## **4 Risk management**

### **4.1 Assessing the risk of arson**

Risk assessment should be an ongoing process of evaluation in all premises. The fight against deliberate fire-raising should start with an arson risk assessment undertaken as an integral part of the fire risk assessment and designed procedures for existing security and general fire protection arrangements must be taken into account. The risk assesment also needs to be undertaken for the premises in compliance with national legislation.

*Note: Reference is made to ISO 31000 Risk management – Guidelines.*

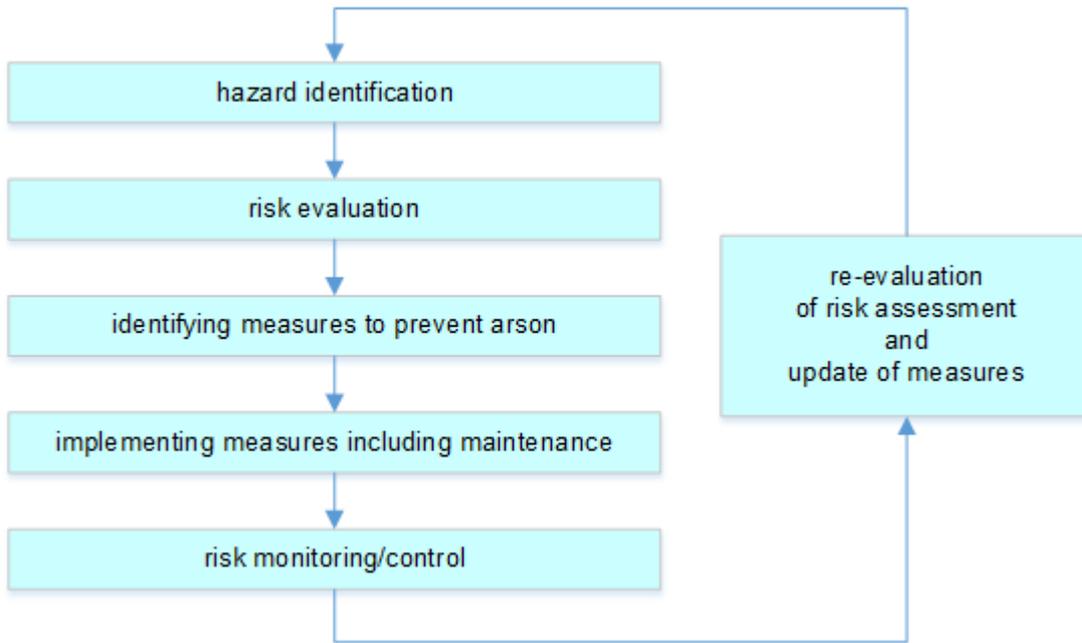


Figure 4-1 Risk handling circle

In preparing countermeasures against arson the various agencies concerned and the managements of industrial and public buildings need to consider with care the relative vulnerability of different categories of buildings and individual premises within those categories as well as various other factors which affect the risk

The defensive measures taken by the company will depend on the severity of the perceived risks and on whether the risk is of a permanent or temporary nature.

Management should start off on the assumption that arson, from whatever quarter or motive, can be prevented if thought is given in advance to the potential threats. Generally, the action of the arsonist is not so skilful that his plans cannot be frustrated by comparatively simple methods. Even the intruder with considerable expertise can be deterred by suitable security measures.

The potential for a building to burn down always exists. Arson is merely another ignition source in addition to those inherently present, although a very important one. In assessing the risk from arson attack, management has to consider the possibility of such attack externally from intruders and internally from employees. A number of factors have to be taken into account

It may be known that fire raising has occurred in the neighbourhood. It is helpful for the firm to maintain liaison with the police to ascertain whether an arsonist is operating in the area. Other firms may also be able to supply information on a mutual exchange basis. Local newspapers should be read.

Security of the building should be assessed in respect of any political or racial issues. If labour relations are bad or redundancies have occurred, trouble could be expected. A positive interest should be taken in employee attitudes and any internal conflicts resolved.

The attitudes of neighbours should also be assessed. It is clearly beneficial that neighbours should be positively encouraged to take an interest in the continued existence of the premises. If there is local anger arising from a noise nuisance or unpleasant smells being given off by the work operations, trouble could result. Buying up of property in the locality could also be a cause for resentment.

## 4.2 Rating point on arson risks and measures

The remainder of this chapter comprises tables which allow the company (A) to assess level of hazard and (B) relative effectiveness of security measures. The tables can also be used as checklists for identification of vulnerable points so that appropriate	Points
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	Continuous surveillance of all gateways and entrances by gate-keepers and/or video surveillance system (VSS) cameras; the video monitors under observation in a continuously occupied office, doors and gates controllable from a central point.	10
2	Measures against intrusion	
2.1	Structural measures	
	Enclosure of entire site with security fencing/gates (see text).	12
	High security perimeter doors and window protection, if accessible (see text). Arrangements for safe keeping of keys.	10
	Facade of masonry or equivalent material with a height above ground of at least 2 m.	3
	Adequate illumination of facades and sensitive parts of the site.	5
2.2	Technical measures	
	Approved intrusion detection installation with alarm notification to a continuously occupied point (e. g. reception, Alarm Receiving Centre)	
	'Shell' surveillance (windows, doors, skylights etc.) of vulnerable buildings.	18
	Interior surveillance (electronic sensors to monitor areas three-dimensionally).	7
	Outside surveillance (fence surveillance systems, remotely monitored, detector activated VSS etc).	10
3	Fire safety precautions	
3.1	Structural measures	
	Construction with approved level of fire-resistance.	10
	Separate, lockable, fire compartments for the storage of flammable materials.	5
3.2	Technical measures	
	Sprinkler systems which protect the whole building and which are protected against sabotage.	10
	Fire detection systems which monitor the whole building.	10
3.3	Organisational measures	
	Waste containers of metal and with lids. The containers protected against unauthorised use.	8
	Storage of flammable materials a minimum of 10m from buildings or in accordance with regulations.	5
	Tidy storage: gangways clear between the storage.	3
	Passages and stairways free of combustible material.	2
	Closing of all fire protection doors after working hours.	2
	Closing of all fire protection doors automatically by operation of fire detection.	5
	Regular removal of waste.	2
	Works fire team on continuous stand-by.	20
	Regular inspection of all safety equipment and fire protection measures with check list and immediate correction of any faults.	3
	Staff trained to deal effectively with fire situations, particularly the correct selection and use of fire extinguishers,	10
	A dynamic emergency procedures plan (e. g. handling fire brigade response and behaviour of the employees).	10

Total amount of points	.....
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**Table 4–2:** Points system to determine effectiveness of various safety/security measures

**Rating points on security level**

<i>Points</i>	<i>Security level</i>
0 up to 29 points	low
30 up to 59 points	satisfactory
60 up to 89 points	good
90 points	very good

**5 Prevention of arson**

Fire prevention and prevention of arson in companies is not a simple matter to tackle although excellent results can be obtained. It is essential to act with and through the personnel, for if the latter are not informed, any attempt at prevention in this field is doomed to failure.

Likewise we should recall that any preventive procedure or system that is instituted will be more effective if it is not imposed on personnel, if they accept it in good part and especially if it does not mean that they are subjected to unnecessary constraints. These measures and systems must allow personnel to live and work normally and must never be seen purely as instruments of control or surveillance.

Management have a leadership role in the fight against arson but they must also ensure all their staff feel they have an equal responsibility to protect the business from disaster. Likewise, the person responsible for security should not be seen as the only person really involved in the matter since everyone involved in the company has exactly the same role to play.

The basis of effective action in this field (as in many others) remains: respect of the individual, reliable information and communication.

**5.1 Development areas concerning arson prevention**

Arson is often a very complex problem with a number of causes and related factors, so the prevention of arson must also include a number of different dimensions, which focus on the different areas of the phenomenon. The most effective and comprehensive prevention strategies aim to balance the following four key components:

- implementation of high-quality fire investigations
- law enforcement and control measures
- pedagogical elements and the situational prevention of arson.
- Technical measures, guidelines, communication and social and healthcare services were mentioned in the responses

A few proposals advocated broader news coverage and education, so that people would be familiar with the appropriate methods they can take to prevent arson for their part. Secondly, people's awareness of the spreading of fires and the damage that fires can cause should be increased, so that the number of malicious fires could be reduced as people would be aware of the risks of fires. Solving crimes involving fire through effective investigation and informing the public about them was seen as a way to reduce the reward for the arsonist and increase the risk of being caught. In some responses, the following were mentioned: self-preparedness, identifying risk groups through profiling and influencing them through education and, for example.

Experience at local level shows that the number of cases of arson can be reduced by effectively and systematically utilising and co-ordinating the limited resources that are available. Preventive work of a more targeted nature must, however, be carried out to bring about a permanent reversal of this trend at national level.

In some responses, it was stated that the authorities are not able to prevent motivated persons from lighting a fire. In addition to financial benefits and covering up a crime, motives were stated to include envy, bitterness, depression, self-destruction and the need for recognition. In addition to technical means, safety can be increased by the design of the built environment, which creates a framework for interpersonal encounters and natural control.

## 5.2 Information about arson for young people

Co-operation with young people and information for children and young people will reduce the risk of arson. Experience shows that preventive action against arson – directed towards young people – has the effect of reducing vandalism of other types in the community. Action against arson can therefore be co-ordinated with other action to prevent vandalism so that juvenile delinquency in society may be reduced. In the cases where arson is committed by young people; those young people do not understand the consequences of their actions, for themselves or for their surroundings. Information is therefore the major challenge and also provides the opportunity for enduring improvements of a more long-term nature.

Fire protection associations and individual rescue services with police, insurance companies, social services, schools etc. Who have produced information material and have been active at local level should highlight the issue and promote arson prevention work at society.

The most important part of local activities is the provision of information to young people in school. It is also possible to prevent fires in schools by education. Knowledge about how to prevent fires and how one should act in the event of a fire is important and within the rescue service there are good knowledge about fires that can be valuable for students to take part in.

Fire can be perceived as exciting but also as scary. It is essential that the education becomes positive, communicate confidence in the students' ability and that it is evident and action-oriented. Most children do not start fires and research indicates that information based on deterrence is counterproductive.

The education should partly be action-oriented and partly and focused on influencing attitudes. For example, the rescue services can help develop students' knowledge about fires, like how one should act in the event of a fire alarm or learn how a fire extinguisher works while teachers who know the students better, have better conditions to work with their attitudes.

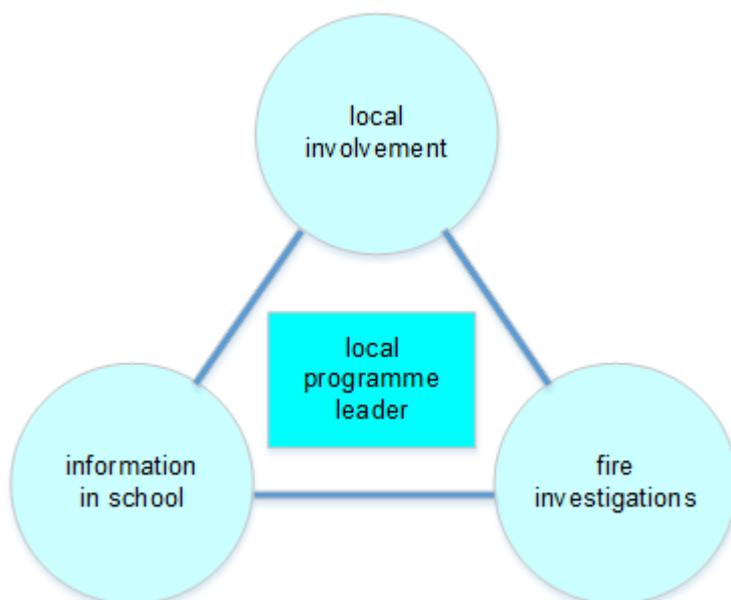


Figure 5-1 Prioritised action areas

The areas in Figure 5-1 are the case areas on which efforts should be concentrated unceasingly. Only then will it be possible to break the trend and to bring about a more lasting reduction in the incidence of arson in society. This will have the great additional benefit of helping to prevent our young people embarking on a criminal career. The most important part of local activities is the provision of information to young people in school.

## 5.3 Security as part of management responsibility

In the modern world companies cannot survive without continuously adapting to the many risks that threaten them. The management of any enterprise, whether it is a factory, warehouse, shop,

office building, hotel or public building, has a responsibility to ensure that the enterprise will continue to function effectively for the benefit of its customers, clients or visitors, as well as for the shareholders in the business and the workforce.

Interruption of the successful running of the enterprise can take many forms including, for example a cut in electric power, a strike, loss of vital raw materials – or a fire. It has been said that a fire can be one of the quickest and most devastating ways of stopping a business.

Today a major starting point of fires in every kind of enterprise, whether in industrial buildings or in buildings used by the public, is arson – the fires which are begun deliberately for one reason or another. Often these deliberate fires are associated with malicious acts (e. g. break-ins, vandalism, etc.). In attempting to prevent stoppages for these and other reasons the management needs therefore, as an integral part of its operational planning, to consider each and every one of the risks and to take the necessary action to prevent an occurrence and to limit their effects.

It could be said that the whole of the content of this document is, therefore, the business of management because each section of the guidance considers different aspects of the risk of arson and methods to control these risks.

In brief however, management responsibility can be said to encompass the following:

- analysis of the risk of arson (e. g. the vulnerability of the enterprise to arson attack from outside and from within)
- consideration of the effectiveness of different remedial measures, taking their cost into account
- relating the risk analysis and remedial measures to the total fire safety and security programme operating within the enterprise

It is to Giving particular attention to the following measures:

- the appointment of a person responsible for fire safety and security including arson
- the instruction and training of all staff to make them aware of the danger to them and the business from fire including deliberate fire
- the installation of appropriate and cost-effective fire and intrusion protection equipment (e. g. intrusion detection, access control, VSS, fire alarms, sprinklers, etc.)
- surveillance procedures (patrols, watchmen, caretakers)
- liaison with police and fire brigade to ensure appropriate preventive measures before, and effective countermeasures after, an arson attack
- having an in-company system for investigation of fires
- having a contingency plan should the worst happen

## **5.4 Arson by employees**

### **5.4.1 Approaches to a solution**

The risk of arson inside an enterprise such as a company is of a different nature from other types of arson risk. The prevention strategy to be implemented must be both original and imaginative and must be aimed at improving human relations and exchange of information in the company, since these two aspects are essential to success of the strategy. This approach is particularly important in dealing with potential arson committed by persons working for, or having once worked for the company, whether their motivation is personal or dictated by factors outside the company, i.e. when an employee is used as an instrument by another or others.

Prevention in this field must be centred on human relations and must concern every level of the company, i.e. all the different partners must be involved. Unfortunately there is no absolute method or 'recipe' for implementing this type of prevention. Each situation is unique and specific to the profile of the arsonist and that of the company.

However a certain number of means and procedures can be suggested and applied. They concern almost exclusively the role and behaviour of the different partners within the company since

much depends on labour relations, human relations, understanding, information and communication.

#### 5.4.2 Prevention role of people

**Management:** Apart from its essential role of managing the company, it also has the task of determining the company's labour policy, the salary scale, bonuses etc – all sectors in which discontentment and disappointment can easily arise.

Providing regular information on the progress of the company and explaining the strategy chosen would appear to be good preventive tactics.

**Supervisory staff:** This category has an important role to play in the company because of its position between the management, the other employee categories and trade unions and employee associations. Its job is to 'transmit' information, and if it does not always receive adequate explanation or supporting arguments for this information, unnecessary and time wasting conflicts may arise.

Supervisory staffs have a fundamental role to play in prevention of arson, for the following reasons:

In practical terms, they tend to work late in the evening and start early in the morning, which is useful for surveillance of the premises. They are familiar with the different work stations and the strategic points of the establishment and therefore likely to notice any abnormal situation and inform the authorised person.

In human terms, they are familiar with the company's employees and provide a willing ear. A foreman for example has a close relationship with his co-workers and knows them individually, not solely in the work context but sometimes in the context of their private lives. In practice he is the first to notice that something is wrong and may, if he thinks necessary, take action before anything irrevocable is done.

**The person responsible of security:** He has a pivotal role to play in security in the establishment since he is (or should be) in contact with everyone and must ensure that communication flows easily through all levels of the company.

He is the person most concerned with communication in the field of arson.

He must be simultaneously available, ready to listen and act as confidant while always remaining impartial in his evaluations and judgements. He will often be the first to discover an abnormal situation and strange or unusual behaviour. He therefore plays an essential preventive role in the fight against arson in the company.

**Employees:** Plant workers and white-collar staff know each other well since they work together. They are ideally placed to note any unusual behaviour or abnormal attitude on the part of their colleagues and to inform the right people.

**Personnel and labour relations department:** The task of this department is to manage personnel but also to be aware of their motivations and desires. It has an undeniable role to play in prevention but it must avoid falling into the trap of policing the establishment.

It should act effectively whilst safeguarding the rights, the freedom and the personality of the individual and his family. The personnel file which details all aspects of the person's professional life, job entry tests and family information, must be used with the utmost discretion.

**Trade unions and employee associations:** It is essential that trade union and employee associations, which should be regarded as useful partners in the business of defending the interests of the company as well as those of employees, be kept informed in these matters. They play a valuable daily role in the security of the company and in particular in prevention of arson since one of their permanent motivations is the defence of the tools of labour and thereby employment. No trade union delegate wishes to see his company go up in smoke, even if he disagrees with a particular measure or is unhappy with a particular strategy.

**People involved closely with the company:** We are referring to doctors, factory inspectors, nurses, social workers – the role of these people in the fields of prevention, medicine and family assistance is well known to all. There is no need to dwell on the help they can provide but they

should definitely be kept informed and invited to take part in brainstorming sessions on the subject.

**Security advisers:** It is recommended to consult security advisers on security requirements of new buildings, particularly schools, which are more resistant to theft, vandalism and arson.

## 6 Measures to prevent arson

### 6.1 Security measures

A programme of practical measures for the protection of any building against arson attack covering security equipment and systems (enclosure and other aspects of security of the building, lighting, surveillance, alarms); general fire precautions including good housekeeping; organisational measures (guarding, access control, and inspection and maintenance of systems). The design of the security arrangements should take into account any national standards or criteria operated by insurers. It is essential that high security approved and (where available) certificated products are selected. The following advice is based on the assumption that such products are employed on a 'Best Practice' basis.

#### 6.1.1 General fire precautions

Investigations have shown that in all large-scale fires, serious errors in the overall safety concept have contributed significantly to spread of the damage. Effective fire precautions are the surest and most effective protection against arson and its effects.

Since in case of arson the fire will often occur in unexpected places, or at several points simultaneously, the planning of fire precautions should take these circumstances into account. The most important precautions are:

- Preventive precautions which prevent outbreak and spread of fires, e. g. by dividing the production and storage areas with fire walls and spatial barriers into the smallest possible fire hazard sections.
- Defensive fire precautions which detect and fight a fire on outbreak, e. g. by installation of automatic fire detection and/or automatic fire extinguishing systems.

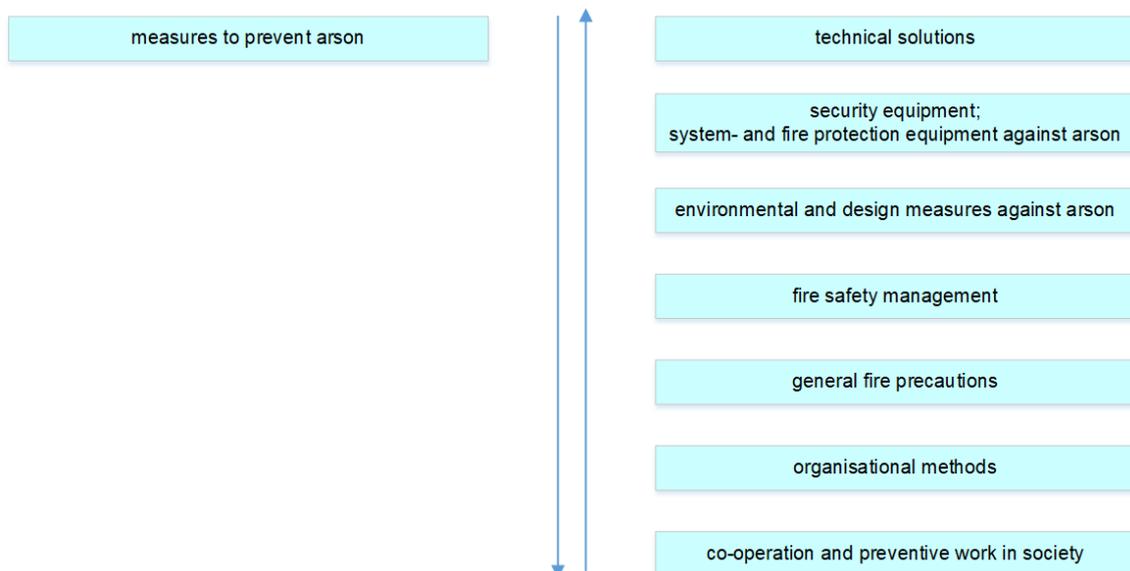


Figure 6-1 Facing risk, prevention of arson

As shown in Figure 6-1 risk prevention should take into account the internal risks of the organisation as well as risks from the outside.

### **6.1.2 Storage areas with readily ignitable liquids, gases or substances**

Flammable liquids, gases and readily ignitable substances which can be used as fire accelerators should be stored in separate fireproof areas which are kept under lock and key at all times outside working hours. The presence of waste and rubbish near exterior walls or on freely accessible ramps and directly behind the enclosure should be avoided.

### **6.1.3 Schools and similar premises**

There is not a simple answer to why schools are exposed to fires, but there is a clear connection between conflict situations, vandalism and fires.

Paying attention to early signs, it's possible to break trends that lead to a deteriorated psychosocial environment, violence, vandalism and fires. Zero tolerance, responding directly to signals like attitudes and behavior changing in the negative direction. The problems are complex and if they are to be dealt with, it is not enough to focus solely on individuals. The whole culture at school needs to be considered. In practice, this means that all concerned need to be involved, school management, teachers, parents and pupils. As adults, being a good example, living as you learn, is, as always, an important factor when it comes to influencing young people.

Safety and security assessment is a method to find places that need to be addressed. This means systematically walking around and identifying places that feels unsafe. It is important that the school has a plan for how the results should be used. If nothing happens, the risk is that the action will have the opposite effect. The improvement suggestions that result from Safety and security assessment in the school may be of a technical nature, but it is also important for the school staff to know which places are unsafe so the presence of adults can be prioritised there.

## **6.2 Organisational methods**

### **6.2.1 Guarding**

To avert risk to a company from within (arson by company employees or visitors), additional measures are necessary. These should reduce the opportunity for arson, restrict the freedom of movement of the arsonist and minimize possible consequences.

An essential precondition for combating arson is suitably organised guarding of the works by watchmen or works security personnel. Guarding of this nature must be assisted by technical measures. To minimize the cost of surveillance by watchmen, particularly for small companies, a viable solution in industrial estates, for example, can be for several companies to combine for the purpose of their premises being guarded jointly by in-house guards or a security company.

All parts of the premises should be included in surveillance. Ideally, surveillance should be carried out immediately at the end of working hours and subsequently at various intervals which should not exceed two hours.

The initial check at finish of working hours is the most important. Here, adequate time should be available for checks to be carried out to see whether all inside and outside doors are locked. Works areas which have been shut down and buildings seldom frequented should be included. Rounds should not be made following a uniform timetable, but constantly changed, so that any occurrences are more readily recognisable by the watchman as 'not normal'. The watchmen should make their rounds in accordance with detailed checklists in which current changes in works routine are also noted. The fire safety manager will be responsible for these checklists.

### **6.2.2 Works security/guard companies**

The number of guards should be suited to the importance and size of the company. At least two watchmen should be available for each watch, one to man the watch centre and one to make the rounds. The watchmen should be equipped with radio communication and accompanied by a trained guard dog (greater radius of surveillance deterrent effect). The rounds of the watchmen should be checked by means of suitable systems.

### **6.2.3 Access control/surveillance of entrances**

Access to the works premises should be controlled to deny access to unauthorised persons. In large companies control cannot be carried out effectively by guards alone so that all personnel

should be issued with electronic access control cards/tokens. To relieve the gatekeeper, an 'electronic turnstile' (or a mechanical turnstile) system is desirable which allows staff access through the enclosure. Employees can gain access on their own by using card/token readers; visitors must report to the reception and can thus be recorded effectively. With 'electronic turnstile' systems of this type, it is additionally possible to cordon off areas with high security requirements within the works, such as for example computer centres.

#### **6.2.4 Inspection and maintenance of security measures**

Security measures should be inspected and maintained regularly to ensure that they are in good working order. Any deficiencies should be remedied at once. If this is not possible, equivalent safety measures should be taken. Such inspections should be carried out with the aid of a check list.

#### **6.2.5 Environmental and design measures against arson**

In this chapter we consider related measures – the role of building design in making it more difficult for people to start fires outside or inside the building; and the ways in which local surroundings, 'the environment', can be treated in order to lessen the risk of arson fires.

#### **6.2.6 Improved protection through building design**

In the design of new buildings, and in refurbishment of existing ones, much can be done by the architect or building surveyor to render arson attack more difficult. Protection against fire generally and arson in particular are matters that need to be fully integrated into buildings at the design stage.

Design begins with choice of site. From the point of view of security it is helpful if the building is not isolated and if it is under surveillance by neighbours and passers-by.

Public areas surrounding a building should be capable of observation from that building's windows. This is particularly important in regard to access points.

Avoid the 'wandering coastline' (i.e. walls of buildings having indentations) which gives 'lurking' space for intruders and arsonists. Rectilinear buildings are best from the security point of view. Buildings are especially vulnerable at the rear. Avoid recessed doorways and secluded courtyards which provide cover for vandals/intruders.

External areas which are totally enclosed and invisible from surrounding streets are dangerous; once an intruder has scaled the wall he is completely hidden from view.

Roofs – particularly flat roofs – provide access to other parts and into the building. Give special thought to low outbuildings, garages, etc., which provide access to upper windows. Access to roofs should be made as difficult as possible.

To prevent access to roofs it is a good idea to have deep overhang of eaves. Roofing can be of slippery seamless material that is very difficult to walk on.

Avoid external drainpipes that can be easily climbed giving access to flat roofs and upper windows. Escape routes from the building should lead to areas which are supervised.

Stairwells should have as many observation points as possible, positioned so that landings can be seen by passers-by.

Flower beds and the like, while attractive, can provide cover for intruders. Keep vegetation at low level, especially near doors and windows.

The number of external doors into the building should be kept to a minimum.

Darkness is the greatest friend of the wrongdoer. One of the most effective methods of protection is to make the building readily visible at night to the public at large. It is particularly important to install external security floodlighting for storage areas and at the perimeters of buildings in secluded locations where break-ins are considered likely.

Avoid creating areas of shadow. Lighting fittings and controls should be designed and sited so that they are not themselves vulnerable to malicious damage.

Areas subject to special hazard (e. g. control rooms, data archives, rooms containing key equipment) should be arranged along outer walls of the building with no openings in the outer walls.

Alongside the structural and design features in protecting a building, general tidiness and cleanliness also play an important part in discouraging vandalism and in ensuring that the arsonist is not provided with readily accessible fuel to start a fire.

Good protection is also helped by having a clear, uncluttered, layout which is easily surveyed.

### **6.2.7 Layout of surroundings, general tidiness, cleanliness**

#### **Surrounding terrain:**

It should be possible to survey the complete terrain. Any obscuring features should be artificially landscaped by filling, levelling, etc. Vegetation is not to impair surveillance.

#### **Development of a terrain by roads:**

The road network is to be as short and surveyable as possible. If possible arrange for entry and exit through a single opening in the outer fence.

#### **Storage on the site:**

- If materials are stored outdoors then the stacks should not commence directly at the outer fence or at the building.
- A vacant strip of land at least 5–10 m wide should be present between building and storage stack and between fence and storage stack.
- Stacks can be higher if there is a surrounding wall (see also CFPA-E-Guidelines No 7 : 2011/F Safety Distance between Waste Containers and Buildings).
- Flammable stored materials should be separated by stacks of materials which are non-flammable or only combustible with difficulty – hence the outermost stack facing the road should consist of non-flammable materials or those combustible with difficulty.
- Clear arrangement of storage stacks to facilitate checking and surveillance.
- No materials such as paper, wood waste etc are to be allowed to gather between the stacks.
- If grass grows between and adjacent to the stacks and along the building facades, then this is always to be kept short by mowing.
- Loading ramps and external facades are unsuitable locations for storing packing materials such as wooden palettes, wooden packing cases, etc.
- Only metal waste containers are to be used, they must have a locking facility and must not be overfilled.
- Regular cleaning and rubbish clearing activities are necessary on the complete site.
- Easily combustible solids and liquids which could encourage an arsonist should not be freely available on the plant site, they should be kept locked up in secure containers or rooms.
- Ladders and other similar equipment are to be stored to prevent unauthorised use.

#### **Cleanliness and tidiness:**

Cleanliness and tidiness are measures of the first importance in the interest of internal security. These include:

- tidy storage
- adequate storage spaces
- secure storage of hazardous substances
- intermediate spaces kept free
- safe storage of waste
- keeping passages, stairs free
- no-smoking rules compliancy
- cleanliness in the despatch department
- daily removal of flammable waste from storage and production areas
- keeping flammable waste in non-flammable containers
- no combustible substances lying around in disorder inside or outside the works buildings
- care with the siting of automatic vending machines

### **Housing estates:**

Anonymous open spaces and semi-public areas over which no-one has any control (e. g. dark arches under massive concrete stilts, lonely walkways and hidden corners) should be avoided in housing estates or shopping centres. Recreational amenities can be provided for children so that they are not tempted to play on stairways or corridors of flats.

### **Shopping precincts:**

In shopping precincts surveillance can be greatly improved by avoiding or resiting obstructions such as telephone booths or thickly planted areas.

### **Derelict buildings:**

Derelict buildings, open wasteland or building sites which are easily accessible, are all tempting targets for the opportunist arsonist. Derelict buildings should be boarded up, open wasteland should be fenced off and building sites should be adequately protected against intruders.

Lack of maintenance or repair of damage encourages further vandalism. Damage should be repaired immediately.

## **6.3 Security equipment and systems**

For more specific details refer to the *CFPA-E-Guideline No 12 : 2020/S Security Guidelines for Business*.

### **6.3.1 Enclosure**

A robust enclosure is one of the most suitable measures for denying potential arsonists access to property.

An outer enclosure should:

- prevent crossing of a property limit
- impede intentional surmounting of a property limit
- delay intentional forcible surmounting of a property limit

An outer enclosure is any system for enclosing a property, including gates and doors. The enclosure shall be uninterrupted. It should, if possible, run in a straight line along one side. As outer enclosure, a wire mesh, a steel lattice or a steel profile frame fence with:

- a minimum height of 2.50 m above the ground, including climb-over protection, (subject to local regulations)
- crawl-under and climb-over protection
- a maximum uniform post interval of 2.50 m

should be provided.

### **6.3.2 Building security**

The objective of any security system to prevent unlawful entry is to increase the time expended by the intruder and to act as a deterrent. Such security should be taken into account at the planning stage and architects can provide important assistance in convincing the proprietor of the necessity for installing intruder-deterrent door and window elements.

External walls which are readily destructible or combustible should be avoided.

### **6.3.3 Doors**

It is difficult to select all components of a door and to match them to one another such that maximum protection against intrusion is achieved. For this reason, only tested, approved and certificated security doors sets (door including suitable frame) should be considered for high risk situations. The standards are based on dynamic tests, static loadings and, last but not least, manually performed intrusion tests corresponding to the forces and techniques normally occurring during a break-in. These rules specify requirements for both individual parts and complete door sets.

An installed door set should fulfil the following requirements:

- The entire frame shall be firmly anchored in the masonry.
- The door leaves offer adequate resistance to attempted break-in. They can be made of wood, metal or – if suitably designed – of other materials.
- At least three burglary protecting door hinges shall be fitted according to design.
- In the case of a door opening outwards, hinge security fittings or backing hooks should be provided.
- The locking of the door shall withstand high loads.
- The lock should be protected by a burglar protecting door shield.

#### **6.3.4 Locks**

Burglary protecting locks should have a throw of the bolt of at least 20 mm. If the lock is capable of being operated from the inside without the use of the key, an assessment must be made of the exposure to manipulation e. g. via adjacent glazing. Internal keyless operation may be essential (e. g. if the door is a means of emergency escape) but, otherwise, operation should be by key on both sides.

#### **6.3.5 Lock mechanisms**

Lock cylinders are exposed to attack by criminals. Approved locks incorporate robust protection against such attacks.

#### **6.3.6 Striking plate**

Long and thick enough design which can be anchored to the masonry. In the case of metal frames, reinforcement of the recess for bolt and latch engagement.

#### **6.3.7 Door hinges**

Heavy duty hinges which are firmly attached to the frame and the door leaf. If possible, additional fittings of 'backing hooks' (also known as 'dog bolts', or 'hinge bolts'). Backing hooks should be provided in all cases where the door hinges are on the side prone to interference.

#### **6.3.8 'Cross-bolt' lock**

These locks or crossbars with locking bolts, are engaged right across the entire width of the door in lock cases securely anchored to the wall on the left-hand side and right-hand side of them. The crossbar lock fulfils three functions simultaneously. In addition to the properly locking function on both sides of the door, it reinforces the door leaf itself. When correctly fitted, the crossbar is a very effective additional locking system which will normally suffice, even when special security is required, for example, in the case of rear exits. These devices are usually 'retro-fit' devices.

#### **6.3.9 Multipoint locks**

These are usually already incorporated into doors that are sold complete with their own, integral, locking arrangements. These are seldom fitted retrospectively ('retro-fit'). The bolts may secure the door on the locking side only (e. g. two or three bolts), or on additional sides (e. g. both sides, sides, top/bottom). This is a secure arrangement (which also has the effect of reinforcing the door leaf itself).

#### **6.3.10 Espagnolette bolt lock**

These locks, also called bascule locks, are particularly suitable for securing double-leaf doors. When operated, bars are moved, the ends of which engage in striking plates fixed to the door frame or floor. The range extends from the twin bolt lock, which locks top and bottom, to quadruple locking on all four sides of a door.

The following features are important for securing windows:

- the whole window should be burglary-resistant (proved and certificated) – as with security doors
- if normal windows are used, these should be upgraded additionally with retrofit products
- retrofit products are given in a large number of designs and for several applications
- it is recommended to only use retrofit products that have been tested and certified by an accredited third party.

### 6.3.11 Burglar resistant windows

Burglar resistant window designs, where all parts relevant to security have been matched to one another, shall be provided in the lower area of the building. In the upper building outer walls, glazing resistant to penetration by thrown objects in accordance with national standards will suffice. It is generally accepted that intruders will be deterred from attempting to enter windows that are 'out of normal reach' (defined as requiring a climbing aide above 4 metres).

Conventional windows provide only slight protection against intruders. A tried and tested method of protection against intrusion is the use of two or three retrofit products (additionally mounted locks) which will offer a modest improvement. If the window cannot be readily opened without smashing the glass a certain type of 'inexperienced' intruder *may* be deterred. As well as additional window locks, installation of which should be standard practice for accessible windows, the use of intruder-deterrent glazing may be considered. The performance features of glazing systems are specified in national and international guidelines and standards.

Alternatively (or additionally) various types of physical window barrier can be fitted ranging from lightweight steel mesh to heavy steel bar grilles. Selection of such a barrier is a matter of security risk assessment.

For example, steel roller shutters with solid slats (laths) can form a very effective barrier, provided high security, criminal resistant products are selected, however, only if the shutter is closed. Moreover, because there are no apertures in this type of barrier, lighted materials can not be pushed into the premises. Completely 'blind' shutters of this, and equivalent types, are especially recommended as a defence against arson but care is required that burning materials can not still be pushed through broken glazing and ignite contents 'by-passing' the sides of the shutter defences. Thus, externally fitted shutters *MAY* be preferred, provided care is then taken to frustrate the sabotage of the 'shutter box', fixings and securing points.

### 6.3.12 Lighting

Effective compartmentation of a building is the key to minimising fire spread and thus costly property damage and business interruption. It has to be remembered that the potential arsonists do not like to be seen. Good lighting can deter intruders and thus be a cost-effective deterrent against deliberate fire-raising. After that all points of entry to the building(s) should be supervised.

The lighting of buildings, open spaces and outer enclosures, is a valuable measure for defeating the intentions of arsonists. Illumination should be of a standard which permits moving shadows to be readily recognisable.

It is preferable to install several small lighting fixtures, rather than a few large ones. The lighting units should be split up into groups and, if possible, they should be fused separately in the low voltage distribution system. The covers of the lighting fixtures should be resistant to thrown objects. The power supply lines shall be laid securely in the ground or at a minimum height of 5 m. It is advisable to provide automatic switch-on of the lighting by photocell control. The lighting fixtures should be mounted at a minimum height of 5 m. When designing lighting installations it is vital to avoid leaving unlit corners in which an intruder may conceal himself.

## 6.4 Surveillance systems

The type of surveillance and the alarm system selected will mainly depend, in addition to the size of the property and the number of weak points to be monitored, on whether surveillance must be carried out only inside the building or also externally.

In the case of intruder alarm systems, a distinction is drawn between three types of surveillance:

- building 'shell' surveillance
- interior surveillance
- property surveillance

### 6.4.1 Shell protection

The walls and roof of the building provide the physical containment of the area to be protected. In the case of a so called shell protection, priority is given to surveillance of all weak points through which forced entry is most expected. Especially weak points in the exterior wall which must be

included in surveillance are points which can most easily be penetrated with little expenditure of time and with little equipment. These will generally be doors, windows, roof lights, ventilation shafts and walls and roofs of lightweight materials.

Adequate physical protection, such as heavy duty locks, is essential for electronic surveillance. Opening and forced entry detectors are used for 'shell' surveillance.

Opening detectors (e. g. magnetic contacts) monitor the closed state of windows and doors. The detectors trip the alarm when the contact in question is actuated by opening the door or window.

Intruder alarm detectors are able to monitor windows, doors, walls and ceilings of a secured area against forcible entry. For this purpose, for example, glass breakage detectors and vibration detectors may be used to recognise a break-in.

Shell protection has several advantages compared with interior surveillance or property surveillance and is more valuable than interior surveillance for prevention of arson. Any attempted attack will be reported at a very early stage, possibly before the perpetrator has managed to actually enter the premises. However, a carefully designed system will often consist of a balanced blend of 'shell' and interior surveillance.

#### **6.4.2 Trap protection**

To secure special areas of the interiors of buildings it is customary to use motion detectors which react to the movements of persons who have entered a monitored zone. The detectors available are, for example, passive infrared detectors (PIRs), infrared or high frequency radio frequency 'beams', ultrasonic detectors and microwave detectors. The ranges of these devices may vary between 5 and 100 m according to method and type.

Motion detectors are highly sensitive devices which can easily give false alarms if not properly planned and installed. In addition to this, naturally, the detection must meet the appropriate rules and standards.

#### **6.4.3 Objekt monitoring**

Monitoring or surveillance of precise object, filing cabinets with important and/or valuable documents and other individual objects in a room can be monitored separately. For this purpose there are, for example, capacitive field detectors used.

#### **6.4.4 Video surveillance systems (VSS)**

Video surveillance systems or closed circuit television (CCTV) can be very effective but it essential that careful consideration is given to the objective before decisions are taken. For example it is vital to decide at the outset whether the objective is to merely detect infiltration, or recognise vehicles or persons or identify persons (i. e. with sufficient reliability to obtain criminal convictions). The objective will dictate the type (and cost) of the system and the arrangements necessary for the human observation of the images.

A video surveillance system may consist of the following elements:

One or more video cameras; static cameras are usually preferred to cameras that pan, tilt and zoom (PTZ) by remote control. The cameras should be suitable for nocturnal surveillance or for the type of lighting to be in operation.

One or more monitors for video presentation, with, if necessary, a video switchover system. Where several video sources are to be connected to one output, this switchover can take place cyclically and/or manually.

Video motion detection (VMD) may be included. This technology alerts the surveillance personnel to changes in the VSS images (e. g. when an intruder enters the field of view). The device must permit simple programming of the video zones to be monitored. VMD helps prevent the surveillance personnel from failing to observe critical occurrences and sends them alert signals if anything moves in the area being monitored. Alternatively, images can be presented to the observer when a conventional movement detector (e. g. a PIR), sharing the same field of view as the camera, is triggered.

Long-play digital video recorder or 'hard disk' recorder which records all occurrences triggering an alarm. It must also be possible to record and index occurrences from several cameras simultaneously. These occurrences should be recorded in 'real time'. Still video frames recorded at the moment of triggering can also be selected for viewing by the observer.

## **6.5 Open space surveillance (perimeter surveillance)**

A complete system for open space surveillance will consist of the following:

- high security fencing and gates
- open space surveillance sensors such as fence sensors, ground sensors, volumetric sensors
- security lighting
- VSS
- alarm/surveillance centre which monitors VSS images and accepts, evaluates and records alarms
- guard personnel

The open space surveillance detectors on the market utilize a wide variety of different physical principles.

### **6.5.1 Electrical surveillance of fences and walls**

With this method of surveillance, in a similar way to building 'shell' surveillance, interference with the fencing system, such as cutting through fences, is detected e. g. by vibration sensors.

### **6.5.2 Surveillance of ground zones**

Devices known as geophones are installed in the ground. They react to structure-born sound or pressure changes. Alternatively, radio-frequency cable sensors or magnetic cable sensors can be installed in the ground; they trip an alarm when changes in the electromagnetic field or magnetic field are caused by the incursion of an intruder.

### **6.5.3 Light barrier**

A beam of high frequency radio (or infrared light) energy is maintained between a transmitter and receiver located strategically to create a 'barrier' along the periphery of a site. Changes in the electromagnetic field caused by the incursion of an intruder lead to an alarm being triggered.

### **6.5.4 Capacitive fences**

An electrical field is established between parallel transmitter and receiver wires. If an intruder enters the sphere of sensitivity of this field, an alarm is triggered.

## **6.6 Fire protection equipment for control of arson**

In all types of buildings, management planning against fire has to include the provision of the most appropriate and cost-effective fire protection equipment. Such equipment is required to deal with accidental fires as well as deliberate fires, but to ensure control against the latter, additional factors need to be taken into account. Also, since much arson originates from outside the building, it is necessary for management to consider the provision of security as well as fire equipment.

Protection against arson involves contribution from technical solutions as security systems, fire fighting installations and human action should always be implemented in fire safety management as whole. Fire safety management procedures plays always a keyrole as preventing arson.

The approach that should be taken depends on the nature of the premises, the type of business. The strategy that should be adopted will be determined after an arson risk assessment has been carried out. Results always depends on type of the premises. An awareness of the and occurrence of arson is one of the important roles that a fire safety manager has to play. The danger may be from attack by people from outside the company.

Intentionally ignited fires can be very different fire situations. In this case, for example, flammable liquids may have been used, whereby the fire may spread very quickly. The fire may have been intentionally ignited at several different points at the same time, leading to fire control and stopping

more difficult. Utilizing the opportunities created by modern technology and the traditional technology there are ways to create a workable solution for each site that can be tackle threatening situations and fire risks.

Although the characteristics and the level of threat vary, there are basic risks that apply to every site. The first and most important risk management problem is to create a realistic risk assessment. The risk assessment also needs to determine characteristics of the site and what kind of activity differences and risks there are in each site around the clock and how the risks are differs at different times of the day.

It is important to design the fire safety as a whole. This shall take into account the fire resistance of structures, escape routes, fire detection systems, special hazards requiring additional protection, fire extinguishing systems and fire fighting equipment, safe working practices and methods, supervision of management, good cleanliness and maintenance.

Deciding on the type of fire-fighting means most suitable, given the particular risks characterizing a particular establishment, is not purely a technical problem. It is the culmination of a global analysis of the establishment's vulnerability, a process which includes the following steps:

- identifying the establishment's 'nerve centres'
- identifying ignition sources
- evaluating the establishment's capacity to cope with a fire which includes evaluating the maximum acceptable loss-of-operation time as well as the potential direct and indirect losses.
- looking for technical solutions to reduce the criticality of the nerve centres, eliminate ignition sources and install barriers between them and the nerve centres
- installing the appropriate fire-fighting means
- finally, appropriate insurance for risks that cannot be reduced or eliminated and drafting of a safety plan

This process transcends the risk of accidental fire and must also take into account such risks as theft of goods, sabotage, industrial espionage, acts of vandalism – and all other acts of malicious damage besides arson. As concerns malicious acts likely to be committed by persons from outside the establishment, the means chosen will include intruder detection installations triggering human intervention, access control systems covering walls and gates and all other means of passive protection.

### **6.6.1 Fire protection systems**

Designing of fire protection systems needs to be done in compliance with national legislation and be installed in accordance with the findings of the fire risk assessment for the premises

Buildings can also often be empty and quite distant which means that people have little chance of detecting a fire in its early stages. For this reason It is important to equip buildings with automatic fire detection and fire extinguishing systems. The implementation must be assessed on a case-by-case basis, based on a risk assessment. In designing it must be given to consideration the possibility for the rescue service to respond to a fire alarm as fast as possible.

When designing fire prevention as a whole and fire protection systems, consideration should also be given to malicious behaviour. In addition, in the event of a fire, one must consider how the fire threat to the outside of the building can be stopped in addition to the interior of the building. Early alarm and notification of fire via automatic fire detection system can minimize personal and property risks as well as damage from business disruptions caused by fire and also the fire brigade are able to arrive faster.

In the event of a fire, the target must be first to act and react to the situation by the personnel on the site. the necessary action to be taken by personel shall take into account that the fire rescue service is not immediately present at the time of alarm of fire detection system sounds. Regional differences must be taken into account in that responce time. A suitable number of appropriate portable fire extinguishers should be placed in buildings so that necessary supportive extinguishing measures can be done by the personel.

## **6.6.2 Maintenance of fire protection systems**

It is essential that the fire protection systems such as automatic water extinguishing systems and fire detection systems are properly maintained so that they can function properly when needed. Failure to do so may result in death or serious financial loss to the persons on site. The importance of proper maintenance cannot be overemphasized. Neglected maintenance and errors in maintenance an/or installations can effect in the result of prevention of arson. The person responsible/operator should also not neglect the possibility of sabotage or arson in some other area of the site.

## **6.6.3 Manual equipment**

The first line of defence against fire is the provision of portable fire extinguishers and/or permanent hose–reels. Clearly such equipment can only be used during working hours when staff are on the premises (or by security staff if present when the building is closed). For this equipment to be effective it is essential that some, if not all, staff are trained in its use.

### **6.6.3.1 Fire detection**

In most premises – certainly in any which are left empty at night and at weekends – it is desirable to install an automatic fire detection system with a link via a control station to the fire brigade. Fire detection systems are self–monitoring and designed routinely to indicate any breakdown or fault. Shielding of detectors is not monitored, but this type of sabotage is not considered likely.

In the event of remote monitoring, the premises in which the signalling panel and the transmitter are installed must be mechanically protected, any attempts to break into the premises must be indicated and the transmitter and the transmission line must be self–monitored.

When compared to automatic fire extinguishing systems there are fewer problems relating to attempted sabotage of automatic fire detection and alarm systems. This is because in modern installations the removal of detector heads or cutting of wiring causes a fault signal (and a print out in some cases) at the control and indicator panel.

A properly designed detectors quickly and reliably identifies a fire and provides the necessary operating time to carry out a trained procedure by personel to stop a fire that has begun. The automated fire detection system is the hardware that reliably transmits information from the site and also enables the rescue service to operate as quickly as possible. Automatic fire detection system is the most reliable system to do the detection of fire and smoke and then create the alarm locally but also remote. It is important that a fire will be detected without delay as soon as possible in any scenario.

Modern fire detection systems that are capable of various functions, should be taken in account when designing these fire prevention. These functions includes sounding the alarm following the operation of a call point, detecting fire via smoke, heat or flamedetectors, closing fire doors etc. It may also close fire dampers and shut on–ventilation to the spread of smoke. Line–type heat detectors (heat detection cables) can be used as a complement to the conventional fire detection system for the protection of for example schools and cultural buildings where there are high probability of fires being started on the outside of the building.

When designing the fire protection systems it needs to be understood that fire detection system will function and raise the alarm locally and/or remotely. But if there is no fire–fighting team available on site or trained personel who knows what to do or there is no effective automatic extinguishing system, the fire will have cause serious damage before the fire brigade arrives if nothing can be done to stop the fire.

### **6.6.3.2 Automatic water extinguishing systems**

They are effective and have proven their reliability in use. Failure of a sprinkler installation in a case of arson without sabotage of the protection system is most unlikely. This is due to the relatively large surface areas.

In designing these fire protection systems and in risk assesment there should not be forgotten the difference between automatic fire detection systems and extuingshing systems. Automatic extinguishing system is designed to extinguish a fire at an early stage, or keep the fire under control in such a way that it is possible leave the premises in safe and the final extinguishing is carried out by other supportive extinguishing measures. In design it must be taken into account that the

existing automatic fire extinguishing system does not replace fire detection technology or other supportive extinguishing measures by personnel on the site. Therefore, it is important to design the fire safety of the site as a whole.

In establishments not having a 24-hour-a-day fire safety team, or for those at some distance from the nearest public fire brigade station, consideration has to be given to the installation of automatic protection systems.

In case of fire, automatic water extinguishing systems each sprinklerhead opens when it reaches a specific temperature, under the influence of the hot gases released from a fire. It must be emphasised that only the sprinklers over the fire open, the others remain closed. This limits damage to areas where there is no fire and reduces the amount of water needed.

### **6.6.3.3 Automatic gas extinguishing installations**

They are activated on detection of a fire. They may be 'pin-point' installations installed especially to protect hazardous or valuable machines or processes.

'Total flooding' installations are used to protect premises in which there is special risk of fire or which contain equipment crucial to the establishment's operation. Such installations are effective for superficial fires but not deep-seated ones and the extinguishing agent must remain in contact with the fire for a certain interval which means that the premises in which total flooding equipment is installed must be gas-tight.

Automatic gas extinguishing installations protect equipment or premises against fires starting inside the protected premises but not against fires that have started and spread outside the premises. The only effective method of protecting the whole building or establishment is installation of an automatic water sprinkler extinguishing system which detects the fire, sounds the alarm and extinguishes the fire, or at least keeps it under control, until the arrival of the fire brigade. In the vast majority of incidents, fires are effectively extinguished by the operation of no more than four or five sprinkler heads so that resultant water damage is minimal – far less of course than would be the case if the fire developed and was extinguished by fire brigade operations.

Automatic gas-extinguishing installations triggered by fire detection are also designed to signal any breakdown or fault. The gas distribution network is not monitored but this type of sabotage is not considered likely. Openings (doors and windows) of protected premises must be monitored as must access to premises in which relay cabinets are installed if these premises are not under human surveillance. Relay status information must be repeated in the premises where the fire detection signalling equipment is installed. If the bottles containing the extinguishing gas are placed in different premises, access to these premises must be monitored by intrusion detection systems monitored in the establishment's alarm centre.

### **6.6.4 Protecting the installation**

In the event of a fire occurring, it is necessary to ensure that the automatic water extinguishing systems are operational and have not been sabotaged. Checks shall be made to ensure that especially valves are open and that automatic extinguishing systems are able to operate when needed.

Emergency stop switches must not be accessible to non-authorized persons and access should be denied to the room where extinguishing system installation locates. System valves should be identified and the open position should be signaled. Where sprinkler valves are not located in protected locations, the valves should be fitted with padlocks and/or straps strong enough to resist attack.

Although the initial aim must be to prevent arsonist from entering the premises, circumstances may still allow entry, such as in the case of arson committed by members of staff. There may also be cases where incendiary devices are thrown into the building through the windows, for example. In the event of an intruder entering premises protected by an automatic extinguishing installation it is not unknown for attempts to be made to sabotage the installation. Some installations are vulnerable to sabotage and thus must be protected by denying the intruder access to critical components.

To note:

Some establishments having special fire risks (e. g. highly-flammable liquids or chemicals) need appropriate fixed or mobile resources – fixed foam extinguishing systems, or special vehicles equipped with foam or powder nozzles etc.

Suggested improvement:

- a recorder which would time the events (bringing into service and taking out of service of zones, detection of fire(s), spread in various premises) would be very useful to help determine the causes of fires, particularly in cases of arson.
- Even without sabotage, total flooding systems may be rendered useless if exits have been left open. Surveillance of these exits, with indication of operative or failure status of fire detection systems, would reinforce their effectiveness.

## **6.6.5 Taking into account for malicious activities**

### **6.6.5.1 Preventive measures**

The fire protection systems may be vulnerable to sabotage which must be taken in account when operating and maintaining the systems. The only way of ensuring their effectiveness is by mechanically protecting access to vital parts and electronically monitoring the means of access to and/or the status of these parts. If the signalling panel is monitored by a human operator, the installation will be as effective as if it were protected mechanically or electronically.

If the arsonist has made no attempt to sabotage the fire protection installation before lighting a fire, the effectiveness of the system is the same as for an accidental fire. However since such fires are usually started with the help of flammable liquids, they tend to be serious fires and spread very fast. In many cases fires will have been lit in several different areas.

Automatic water extinguishing systems do not always have intrinsic protection or monitoring capability. It is therefore essential to protect the following elements:

- the sources:
  - metering room, valves, public water supply counter and main, valves
  - reservoir, tank, cistern
  - the pipes and conduits linking the sources to the booster room
- the boosters:
  - the engines (motors) and starting equipment
  - pumps and valves
  - booster power supplies
- control stations:
  - internal and external valves

All these elements must be installed in premises protected against intrusion (metal doors, security locks, door contacts and/or volumetric detection). Water extinguishing systems (sprinkler stations etc.) should not be spread out throughout the establishment but should be located in a single place to facilitate protection.

Valves should be indelibly identified and the open position easily verifiable (valve with extending rod). Valves should be fitted with padlocks and chains solid enough to resist hacksaws.

Fuel intakes (petrol or diesel) for booster engines must be protected, as must motor cooling input/output orifices.

Emergency stop switches must not be accessible by non-authorized persons. If activated a fault alarm must be transmitted.

Independently of protection systems, the most important measure is to reduce the establishment's vulnerability and not to facilitate the task of arsonists.

In particular, conduct periodical inspection of the establishment on all the safety and security measures; see also CFPA-E-Guidelines No 01 : 2015/F Fire Protection Management system:

- inside buildings, containers of flammable liquids must always be stored in locked premises, access to which is monitored where possible.

- outside buildings, flammable materials – waste, pallets etc. – must not be stored against the walls of buildings.

Ideally the premises housing the automatic fire extinguishing systems should be checked regularly (daily if possible) in the course of organised patrols or have a high level of electronic surveillance.

The following check should be made during these patrols:

- position of valves
- mode switches set to ‘automatic working’ – pressure readings
- the condition of access doors (hatches or access doors to the metering room, pump and transformer room)
- control stations and valves
- alarm panel, lamp test and other remotely detected information

Surveillance should be entrusted to skilled personnel capable of detecting anomalies likely to put the systems out of service. The personnel should be selected on the basis of responsibility, mental stability and motivation in terms of prevention.

### **6.6.5.2 Operational steps to be taken in the event of a fire**

As soon as a fire (whether or not criminal in origin) or terrorist attack has occurred and after examination of the situation on the site, it is necessary very rapidly to make routine checks to ensure that the automatic water extinguishing systems are operational and have not been sabotaged.

These checks consist of verifying:

- that control post valves and upstream supply valves are open
- that automatic and manual start-up of pumps is feasible

In addition and at the same time the persons responsible should not neglect the possibility of sabotage or arson in some other area of the establishment.

These tasks should be undertaken in parallel with calls for outside help, evacuation of personnel, assistance to injured persons, monitoring of power supplies (gas, electricity, heating).

As soon as the fire(s) has/have been brought under control by the automatic systems with possible back-up by security personnel using conventional fire-fighting methods, and once the premises close to the fire have been carefully checked, the supply valve for the sector concerned will be shut and attempts should be made to render the water extinguishing system operational as quickly as possible.

The work of salvage, drying, enquiry and experts’ reports can then begin.

## **7 Arson investigation**

### **7.1 Reacting on an incident**

In order to establish remedial measures against fire it is clearly necessary to have as much knowledge as possible about the cause, location and other aspects of fires which occur. Such information is obtainable from compilation and study of fire statistics provided by fire brigades and insurers. Included in such information should be data on the incidence of fires begun deliberately.

If there is any suspicion whatsoever on the part of the police, fire brigade or other concerned party that the cause a fire may be arson, it is essential that, as far as possible, the scene remains undisturbed and preserved for investigation by qualified personnel and that the debris be protected from contamination by outside sources.

Having visited the scene of a fire in order to establish where, how and when the burning originated, it is often necessary for investigators to supplement their findings with a laboratory examination of various items. In addition, there are many incidents that are dealt with by police ‘scene of crime’ officers in which laboratory analyses will provide useful corroborative evidence. There will also be a number of cases in which it is necessary, perhaps because of suspected fraud, to establish the nature of the materials that have burnt.

Items recovered from fire scenes tend to be of three types:

- Debris or clothing which may require to be tested for the presence of flammable liquids.
- Domestic or industrial appliances which need to be examined for evidence of misuse or malfunction.
- Materials removed for burning tests to determine, for example, the ease with which they can be ignited or how fast flames will spread across their surface.

Most laboratory work involves analysis for flammable liquids but a large number of other items are examined, especially in relation to fatal fires.

Fire investigation is an essential deterrent and could have a very important effect on prevent the arson. Investigation of fires that results in young people and others who commit arson being called to account for their action is essential from the standpoint of general deterrence. A higher percentage of crimes must be solved. Co-operation between the fire and rescue service, police, the courts, insurance companies, social services etc is of the greatest importance.

## **7.2 Co-operation and role of police and fire department**

Cause-of-fire analyses and fire investigations are often time consuming detective work. In most cases, the vital signs vanish in the first few minutes. Co-operation between the police, the fire and rescue service, insurance companies etc has improved in recent years but further improvement is desirable.

There are several aspects to consider when investigating the cause of a fire. The first key is the fire and rescue authorities and their assessment of the intent or negligence of the procedure. Investigation of fires can be seen as a chain that begins with fire and rescue service and, through co-operation, moves ever closer to the police scene. The starting point is the fire and the nature of the procedure that caused it. Proper investigation of various fires requires to have strong specialist knowledge in the field.

There are concerns about rescue authorities resources for fire investigations when the necessary co-operation between authorities cannot be implemented. Investigations are not in these cases necessarily carried out to enable the information to be used in the future for determining series of fires, identifying fire offences, preventing similar accidents and developing rescue operations.

Local involvement is also vital. The local fire and rescue authority must take responsibility for ensuring that measures against arson are included and dealt with in the agenda, for example, the rescue services plan. The emergency services and the parties who deal with safety and crime prevention activity and insurance issues should be the obvious players in this local effort. The key concepts are enduring engagement and close networking. A model should be drawn up to replicate the local plan to combat arson and to identify the roles of the parties.

## **8 Conclusion**

Arson is a social and economic problem, causing property damage, injury and loss of life. It is considered an important cause of fire in most European states having large impact in terms of severity. As this guidance document has explained, the factor that makes it more challenging to combat than other causes of fire is the fact that it stems from the wilful act of a human intelligence (often seeking to maximise damage or even personal injury) and the motivations can be complex and difficult to pin down.

This introduces more dimensions and complexity to risk assessment than is the case with most other hazards and complacency or resignation are not options. Businesses and enterprises that ignore arson may have to pay a price from which recovery may not be possible when the damage occurs.

Responsible persons for safety/security need not only to familiarise with state-of-the-art control and surveillance measures (of which the most important are outlined in this document) but also to establish systems and structures for the maintenance of a continuous state of vigilance for developments that might point to increased risk of arson. This state of preparedness should include an awareness of the actions required in a post-fire scenario so that investigators are given the best possible chance of establishing if the facility appears to be under attack from the arsonist, thus enabling remedial measures to be implemented quickly.

Finally, an awareness of arson trends and countermeasures should be maintained by keeping in touch with local police, fire and insurance organisations and national/international arson prevention bodies.

## **9 Bibliography**

- Deliberately ignited fires in 2012, Tuula Kekki SPEK, 2012
- Risk Control, RC48 – Arson prevention The protection of premises from deliberate fire raising, 2010 The Fire Protection Association on behalf of RISCAuthority, First published 2010 Version 01
- The Prevention and Control of Arson, Adair Lewis FPA, LPC Library of Fire Safety