

# **PREVENTION OF FIRE IN COMMERCIAL PREMISES**

It is fundamental that a company exists to make profits for its owners and that the aim of management is directed solely to this end. To make profits, the company possesses certain material assets together with the skill of employees to use these assets. Without the material assets – buildings, plant and stock – the business cannot continue to function and there is no quicker method of destroying these assets than by allowing them to burn.

In the same way that sales, production and finances are made the definite responsibility of a director, so also should be fire precautions.

The following figures reflect the direct loss of damage by fire in South Africa: -

Year	Amount
2000	R million
2001	R million
2002	R million

In 1976 the industrial losses amounted to 63% of the total, but in 1977 this had dropped to 49%, indicating that the greater losses are no longer to be found in industrial premises.

In East London, the following statistics reveal that fire is as much a hazard here as in the rest of the country.

Year	Fires Attended	Damage	Risk
2000	1567	21 696 170.00	R209,819,196.00 million
2001	1778	70 515 915.00	R173,614,668.00
2002			R

## Giving warning of fire

The first consideration for the safety of life from fire is that once a dangerous situation is known to have arisen it must be possible to communicate that information to other occupants of the premises. This is to warn them that they are in danger and that arrangements which have been previously made to cope with such situation are to be put into effect.

Whatever means are provided, the person initiating the alarm by operating the system must not be placed in jeopardy by delaying his own escape, neither must there be any doubt as to how the alarm is to be operated. To avoid confusion there should be only one method of giving warning in case of fire.

## Fire Alarm System

The most successful type of fire alarm for commercial premises is a combined P A System/fire alarm, where at least two electronic tone signals can be broadcast over the speakers. Each speaker should also have talkback facilities to the control panel. At each speaker box a manual “break-glass” alarm can be situated which will initiate an emergency situation. With this type of system an orderly evacuation can be made of the building floor by floor, as the evacuation signal can be sounded only on the floor or section which is required to be evacuated. Marshalls in each area can then report progress to control center by means of a P A unit.

This system has the advantage of allowing absolute control to be maintained over all sections of the building and will assist in preventing panic as all occupants can be told the exact emergency situation.

## Public Address Systems

These are not suitable for emergency evacuations. Staff are used to the sound of the P A broadcasting all day and will probably not hear an order to evacuate.

## Electric Bells

Not suitable due to the fact that the sounding of the bell will cause general panic over the whole premises. It is also difficult to ensure that all points in a building are in a position to hear a bell. No orderly evacuation is possible with this system.

## Automatic Fire Alarm Systems

Delays in fires being discovered and further delays in calling the fire brigade are major factors contributing to heavy fire losses.

Buildings can be equipped with electrical fire detection systems which, when linked with fire brigade control rooms help ensure that the fire fighters arrive at the premises before the fires get out of control.

The systems also warn the occupants so that buildings can be evacuated at an early stage. Staff, therefore, need to be trained to recognize and to react correctly to the fire alarm signal.

Fire detectors are designed to detect one or more of three characteristics of a fire – smoke, heat or flame. No one type of defector is the most suitable for all applications and the final choice has to depend on individual circumstances.

In some premises it may be useful to combine different types of detectors or to install both a detection system and an extinguishing system such as sprinklers.

An automatic fire alarm system consists of detector heads positioned in zones throughout the building, these are wired to control and indicating equipment which provides a

reliable power and emergency power supply and activates audible and visible warning devices.

The alarm is relayed to the fire brigade either by Post Office landline or by radio but landlines are not reliable and this type of link is a constant source of false alarm indications.

Automatic systems require regular maintenance and adjustment, and consequently the system chosen should be one with local servicing facilities.

Remember – automatic detectors only detect the fire. Unless the system is linked to a total flooding CO<sup>2</sup> or halon extinguishing system, the fire will continue to burn unless human aid extinguishes it.

### Automatic Water Sprinklers

This is the most effective means of automatic fire protection yet devised. A sprinkler installation comprises a system of interconnected pipes into which sprinkler heads are fitted on a definite basis of distribution. The pipes are supplied with water under pressure. The heads are so constructed that the heat arising from a fire cause any heads affected by the heat to open, thus permitting the water to flow from the pipes and to be discharged automatically on to the seat of the outbreak. The sprinkler system thus detects the fire, gives out an alarm and attacks the fire.

### Means of escape from fire

The primary purpose of escape routes is to enable occupants to go forwards into safety, avoiding smoke and fire, and to escape from the building by their own unaided efforts.

### Smoke: The Killer

The composition of smoke varies considerably with the materials that are burning, and the conditions under which they are burning, particularly as to the quantity of oxygen (from the air) that the fire can obtain. What is generally known, as “smoke” is the visible minute particles of burnt carbonaceous material, together with tar distillates, mainly from wood. Normal smoke from a free burning fire will also contain invisible carbon dioxide gas and considerable quantities of water vapor.

A fire in a building, however, will use up air which will not be easily replaced. Under these conditions there will also be present the very toxic gas carbon monoxide, together with methane formaldehyde, formic and acetic acid, and other gases, all of which produce severe irritation of the eyes and respiratory system. In particular, carbon monoxide will combine with the haemoglobin of the blood, forming a more stable compound than that formed by oxygen. This results in a deterioration of the quality of the blood that will be inimical to health over a great many years, even if heavy concentrations have not been immediately fatal.

The normal level of oxygen in the air is about 21%. As this level falls, the first effect is loss of strength. At a lower percentage judgement and conduct become irrational, though consciousness may remain until the level of oxygen falls below 9%. But after this, a patient would collapse and if left for long in such a state irreversible brain injury would occur.

Because of this lack of oxygen, asphyxiation takes place, and only self-contained breathing apparatus can be used. A handkerchief or cloth placed across the nose and mouth gives no protection against the constituent poisonous gases in smoke, and cannot supply the oxygen that is necessary to maintain life.

Injuries from heat and fire do not usually occur before unconsciousness, but before unconsciousness is complete there is a loss of reality from lack of oxygen, and the effects of the poisonous gases. It is for this reason that all exit routes must be protected against smoke, and in this term are included the products of complete and incomplete combustion.

#### Time to be allowed for evacuation

The normal time for the evacuation of a building is considered to be two and a half minutes. The time is reckoned from the first warning until all the occupants have reached the open air. But under some circumstances it could be taken as the time for the occupants to have passed through a smoke stop door, and to be in the comparative safety of a corridor built to resist fire for thirty minutes.

#### Number of persons involved

So far as is possible, the number of people in the buildings should be forecast accurately, and this number should be broken down room by room and floor by floor, so that it can be known how many people will use any particular exit.

Internal doors on the escape route must open outwards. The daily inspection should be utilized to see that the doors open easily.

Nothing should be allowed in or near the doorway which could foul the operation of the door or movement through it.

#### Vertical exits: stairways

When there are occupants above the ground floor, suitable stairways must be provided. No reliance must be placed on the arrival of the fire brigade to be able to effect a rescue from a roof or other parts of the premises.

No doors may be locked or fastened in such a manner that they cannot be immediately and easily opened from the inside.

Suitable signs must be placed to show the exit routes.

Once having commenced to signpost a route, it should be followed through with a sign and an arrow at every turn until the final exit to the open air.

### Lifts in fire situations

Lifts play a major role in the movement of people in any high-rise building. However, studies have shown that most deaths which occur in high-rise fires are caused by lift malfunctions.

Most lifts will not close their doors and leave a smoke-logged floor and in some cases all the lifts in a complex will be called to a fire floor automatically and be unable to leave it.

All automatic passenger lifts contain some means of ensuring that the doors do not close on passengers. This usually consists of a beam of light aimed across the door opening to a photo-detector. Any interruption of the beam ( say by passenger standing in its path) causes the doors to re-open. Tests indicate that a fire producing volumes of smoke near the lift door would very likely prevent the lift door from closing.

Another feature of many modern lifts which cause them to see a fire involved floor is the electronic touch-type call button. Unfortunately the touch type call button can be activated also by a flame or heat playing on it, calling the lift to the fire floor, opening the doors and engulfing the occupants in heat and fire.

Should you have that misfortune to be in a lift which stops and opens doors at a fire-involved floor, drop to the floor to escape invading heat and smoke until doors close.

Another reason for a lift being called to a fire floor can be that the heat can short circuit a normal lift call button, stopping the lift and allowing the doors to open.

The heat from a fire can also warp the metal doors on a landing thus preventing them from opening or opening fully when the lift arrives and the inner doors open.

People evacuating from a fire floor may also press the lift button on their way to the stairs thus calling the lift to the fire floor. Fires also cause short-circuiting of electrical systems which could cut off the electrical supply to the lifts leaving passengers stranded.

Remember also that automatic fire alarms can be misleading, as smoke rising up stairs can activate detector heads above the fire floor. For your own safety, therefore, never use a lift to escape from a building involved in a fire.

### The Responsibility of Management in case of fire

If a fire should break out, the first consideration is to see that all occupants of that fire compartment can reach a place of safety.

A fire compartment is considered to be a building or section of a building so constructed that a fire will not spread into or out of it for some considerable time. For small buildings, all occupants will be evacuated at once. But where large numbers of people

are employed in buildings such a multi-storey office blocks, which are constructed in fire compartments, it is better not to evacuate everyone at once, but only those people in the section affected.

The checkpoints are the places where employees report that they are clear of the building.

For each checkpoint, there should be a checklist of names of people who are expected to report at that point. This list should be prepared with the help of the personnel department, and kept up-to-date.

The list should be kept near the exist leading to the check point, and its position known to several people so that the absence of the checker someone else will pick it up and carry out his duties.

The assembly point is where people gather in safety until they can be returned to the premises or dismissed to their homes.

In man companies, a book of the rules of the company is given to every employee on joining the firm. The routes usually include instructions on what to do in case of a fire. But the book is very long, and seldom read because of its length. It is therefore advisable to give every employee a personal card, not larger than a postcard, giving on one side short concise instructions on what to do in case of a fire, and on the other side some useful instructions about fire precautions.

Every member of the company, from the chairman to the most junior member receives a card.

#### Instructions for Employees having special duties

##### Ambulance Staff

The ambulance rooms should, if possible, be situated outside any fire risk area, in which case the staff would remain on duty. A portable first aid kit should be kept ready assembled.

##### Canteen Staff

It would be bad policy to ruin the meals of everyone because a fault occurred in the alarm system. According to the position of the canteen, it might be possible to leave at least one cook behind under supervision by a special service marshal.

##### Directors and their Secretaries

It is important that directors set a good example and evacuate the building, treating the evacuation seriously, even for practice.

### Fire Teams

Instructions to fire teams and any private fire brigade will contain the methods by which they will assemble or report directly to the incident. In medium sized premises an instruction is sometimes included that members of the fire team will take a fire extinguisher with them when attending directly at an incident. This brings considerable additional fire fighting power for a small incident.

### Security Staff

Security staff must not be involved in other duties. They will see that traffic is diverted and the roads kept clear for the fire brigade. At all times they will bear in mind the possibility that a fire has been caused to create a diversion.

### Telephonists

Instructions to the telephonists must be prepared according to local conditions. The essential feature is a very large notice that can be read by every telephonist with ease, and without moving from her position. This notice will contain in bold letters on a distinctive background the address of the premises as agreed with the fire brigade, generally in the form of a cross reference, giving the name and address of the firm, with an additional landmark.

In addition to this notice, detailed written instructions should be given to each telephonist. These instructions should also be pinned up on a notice board near the switchboard, and should be reviewed and renewed each year. The essential points in these written instructions are to see that the telephonist does not have to ask permission before sounding the evacuation signals if they are not automatically sounded. Neither does she have to obtain permission before calling the fire brigade or confirming that they have received the call successfully, she is then at full liberty to go immediately to safety if there is any sign of smoke or imminent danger.

After the evacuation signal has been given, the fire brigade contacted and there is no sign of danger, then calls may be made to other people such as the engineer and manager.

Alternative means of calling the fire brigade must also be arranged. These should consist of details of telephones outside the premises to which access can be gained in the event of a complete breakdown of telephonic communication within the premises.

### Outside contractors

A printed instruction should accompany all orders placed outside contractors that, while on the premises, they will comply with the instructions issued to employees of the company.

As soon as an evacuation scheme has been drawn up, regular evacuation practices should take place. If possible, use should be made of outside observers stationed at various points. The fire brigade should always be told before a practice is to take place, and they

will provide observers. The fire brigade will also indicate the extent to which they will be able to cooperate and whether they want a practice message sent through and, if so, in what form.

#### Discovery of a fire or suspected fire

The important point is to sound the alarms immediately to enable everyone to get out in safety, and so that help in the form of the professional fire brigade is started on its way. If there is any doubt whether it is a fire or not, there must be no delay in trying to find out. There must be no investigation for this purpose, but the alarm must be given immediately. The fire brigade would prefer any number of false alarms given with good intent rather than have even one second of delay on a genuine fire. Under no circumstances should a door be opened, not even a cupboard door, to see whether there is a fire behind it. Otherwise a fire that has only been smoldering could suddenly obtain the air it has been lacking, and burst into flames almost with explosive violence.

After the alarm has been raised and no danger threatens and there is an immediate exit to safety, a small fire may be tackled with the nearest fire extinguisher, provided that the operator is between the fire and the exit.

Frequently, there are arguments as to whether a small fire should be tackled first or the alarm raised first. There should be no argument. The alarm must come first because there can be no definition of what constitutes a small fire or the conditions under which it may occur.

In practice, the question seldom arises because in the majority of cases more than one person is present, and both operations can take place simultaneously.

But if there is only one person present, it is very hazardous for that one person to attempt to fight a fire single-handed.

The evacuation warning must always be treated as an indication of danger.

No one must start to run, because it tends to cause confusion and interferes with other people. If everybody leaves immediately they hear the warning, there is ample of time for everyone to reach safety.

Fires can only be tackled by hand appliance if.....

- An immediate exit to safety is available
- You are between fire and the exit
- You have enough fire fighting to safely extinguishing the fire.

#### On hearing the alarm

If there is no apparent danger, shut down machines and switch off all gas and electricity other than the electric lights. These may be needed to help the fire brigade. Any sign of smoke is an indication of danger. The last person out of the room should always close

the door. Any door will tend to check the spread of fire, and it will certainly prevent draughts from feeding a fire. This is also good advice at home at night.

Every new employees on arriving at the place where he is to work should be taken through the evacuation procedure, actually walking over the escape route and through the fire exit doors right to the check point. The same procedure should be adopted for the alternative means of escape. He should also shown the nearest fire extinguisher to where he is working, and requested to read out aloud the instructions printed on the label.

Every new employee should be shown the nearest fire alarm point.

Regular evacuation exercised should be held for all staff to enable them to be kept familiar with procedures.

### Building Floor Fire Marshalls

Every building should have a fire marshall appointed for every floor of a multi-storey building. Depending on the floor area it may be necessary to appoint more marshals per floor, particularly where the building has a large area. The function of the floor marshals is to ensure the orderly evacuation of the areas under his/her control in emergency situations and the prevention of fire by daily routine checks.

In order to guard against employees causing fires through carelessness or neglect, a system of checking at start of work, and even more important, at close of work will ensure the chances of a fire occurring are very much reduced.

Often the departmental or section supervisor can undertake this task more efficiently because of his knowledge of the environment and workers under his control.

However, whoever undertakes the task, it is vital that it is done efficiently and regularly. In multi-tenanted buildings it is vital that the areas allotted to all tenants are visited, and this should be made a condition of the lease by building owners.

### Daily Checks before commencing work

1. **Check Exits** - Unlocked, open freely not obstructed, correctly signposted.
2. **Check fire alarms**
3. **Check fire appliances** - In correct positions – visible check not discharged.
4. **Combustible materials:** away from ignition sources as well as heaters and spotlights etc.

### Important checks at close of day

1. Check for smoldering cigarette ends and ensure ashtrays have not been emptied into wastepaper baskets.
2. Remove combustible rubbish and packing materials.
3. Electrical appliances switched off and isolated from mains.
4. Important documents and records removed to strong room.
5. Internal doors closed.
6. Where CO<sup>2</sup> extinguishing equipment fitted, switch from “manual” to “automatic”
7. Windows closed and premises generally secure from intruders.

### The Role of the Fire Brigade

**PREVENT** fires.

**PROTECT** property against possibility of fires.

**EXTINGUISH** fires that occur.