Fire Safety at Workplaces
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Introduction

Fires bring horrible lessons, and the public should recognise the destruction fires can wreck upon us. Workplace fires causing casualties and damages to the employees as well as employers. So let us be vigilant and cautious against fires at all times.

Fire hazards are not confined to workplaces, and can affect household environment as well. Therefore, increased knowledge and heightened concerns about fires will not only ensure individual safety but also benefit colleagues at work and family members at home.

This brochure covers these important topics

- Requirements of fire precautions as stipulated in the Occupational Safety and Health Regulation
- Hazards of fire
- Common causes of fire
- Formation of fire
- Prevention against fire
- Fire extinction
- Fire fighting equipment and installations
- Emergency contingencies
- Reactions of people in fire
Means of Egress
- Keep all doors leading out of a workplace unlocked.
- Install illuminated signs bearing the words "出口" and "EXIT" conspicuously at each exit. Confirming to the requirements of the code of practice published by Director of Fire Services.

Passageway
- Keep every passageway in a safe condition and free from obstruction.

Means of Escape
- Do not damage or obstruct means of escape.
- Do not impair the use of such escapes.
- Do not alter such escapes without the approval of legitimate authorities.

Additional Requirements
Commissioner for Labour may impose additional requirements for the fire precautions.

Fire-fighting equipment
Do not damage fire-fighting equipment or interfere with the execution of fire prevention measures.
Hazards of fire

High Temperature/Flames
• High temperature and flames burn skin, hair or even deeper cell tissues and cause death.

Presence of Toxic Gases
• Some materials like sofa cushion foam and polyfoam disintegrate under high temperature and release toxic gases that cause poisoning.

Oxygen Deficiency
• Combustion consumes oxygen and leads to a lack of oxygen in the air, thereby leading to suffocation.
Hazards of fire

**Hot Smoke/Fume**
- Hot smoke or fume may impair vision and cause damage to the respiratory system.

**Property Destruction**
- Combustion causes destruction to property leading to the danger of collapse.
Common causes of fire

Poor Management

• Poor storage, transportation and use of materials (e.g. flammable liquids).
• Unsafe installation, use (e.g. overload of sockets) and maintenance of electrical appliances.
• Poor use and maintenance of machinery.
• Improper use and maintenance of fire fighting equipment and installations.

Human negligence

• Improper treatment of cigarette butts and other ignition sources.
• Use of naked flame (e.g. welding) on premises with flammable substances.
• Lack of fire safety awareness.
• Improper treatment of static electricity.

Arson

• Ineffective control of access of people and vehicles.
Formation of fire

For effective fire prevention and fire fighting, we must know the conditions that fires are formed. The diagram at the right shows the three elements that make it possible for fire to break out:

Fuels

- Solids, such as wood, cloth, paper or plastic.
- Liquids, such as flammable liquids or greases.
- Gases, such as liquefied petroleum gas (LPG) or coal gas.

Sources of heat energy (transmission through conduction, convection or radiation)

- Heat energy can be produced as a result of overload of electric current or improper contact of the circuit.
- Improper heat dissipation of electrical appliances.
- Improper treatment of ignition sources, such as cigarette butts or welding sparks.
- Electrostatic sparks.

Oxygen

- Supports combustion. Air contains about 21% of oxygen.

The basic principle of fire prevention and fire extinction is to ensure that the three elements in the "formation of fires" do not exist at the same time.
Control of oxygen is rather difficult. Therefore, the work of prevention against fires should concentrate on the proper control and handling of fuels and heat energy.

- Keep workplace tidy. Do not allow the workplace to be cluttered with debris.

- Make sure that flammable substances are stored in accordance with the requirements of the pertinent legislations, and at a location away from heat energy or ignition sources.

- Electrical installations (e.g., electric wiring and switch boxes) shall be installed and maintained by registered electricians.

- Machineries should be placed at well-ventilated places and cleaned regularly.

- Make sure that fire escapes are not blocked. Keep smoke lobby doors closed but unlocked.

- Provide and maintain adequate fire installations and fire-fighting equipment.

- Prepare fire prevention checklists to carry out regular workplace inspection.

- Promote fire prevention awareness and provide training.
There are 3 principal methods of fire extinction:

**Smothering**
- Insolate fuels from oxygen.
  
  Example: Foam, carbon dioxide and chemical powder are extinguishing agents to use by this method.

**Separation**
- Reduce fuel supply so as to hinder the spread of fires.
  
  Example: Remove unburnt fuels or cut off gas supply.

**Cooling**
- Reduce the temperature of combustion. Fire will be extinguished as a result of insufficient heat energy.
  
  Example: Water is an extinguishing agent to use by this method.
Fire detectors
A fire detector should be connected with the signal circuit and the receiver of alarms. Together, they make up the fire detection system.

There are 3 kinds of fire detectors:

1. Heat detectors
   • Respond to preset temperature or rate of increase of temperature.

2. Smoke detectors (commonly known as smoke alarms)
   • Optical detectors detect the obscuration of a light beam by smoke particles.
   • Ionising detectors react to the interference of radioactive emissions by smoke particles.

3. Flame detectors
   • These are designed to detect the infrared or the ultra-violet radiation emitted by the flame of a fire.

Please note the following to ensure the proper operation of fire detectors:
• Arrange proper repair and maintenance.
• Do not place materials too close to the fire detectors.
Automatic fire extinguishing systems

There are three main systems according to the types of fire extinguishing agents used:

1. Automatic sprinkler systems
2. Foam fire extinguishing systems
3. Chemical dry powder fire extinguishing systems

The automatic sprinkler system is the most common. It is made up of sprinkler heads and water supply pipes that detects and extinguishes fires when operated with the fire alarm system.

The distance between the highest point of stacked materials and sprinkler heads shall not be less than 500mm, otherwise the normal operation of the sprinkler heads will be affected.
Hose reels and manual fire alarm systems

The switch of the manual fire alarm system is normally installed near the hose reel. When a fire breaks out, activate the fire alarm to give off a warning signal. At the same time, switch on the fire services pump to increase the water supply pressure.

When using the hose reels, note the following procedures:

1. Activate the manual fire alarm system.
2. Turn on the supply valve.
3. Pull out the hose a little.
4. Open the nozzle to see if there is any water supply.
5. When water supply is confirmed, pull out the hose to the scene of fire.
### Portable fire extinguishers

#### Applications against different fire sources

<table>
<thead>
<tr>
<th>Types of fire extinguishers</th>
<th>Water agent</th>
<th>Foam agent</th>
<th>Carbon dioxide</th>
<th>Dry powder agent</th>
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<td><strong>Categories of fires</strong></td>
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<tr>
<td>Category I: ordinary fire sources - paper, cloth, wood, plastic, etc.</td>
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<td>✔️</td>
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<td>Category II: flammable liquids or gases - solvents, fuels, LPG, etc.</td>
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<td>Category III: Electrical appliances - motors, electricity switches, etc.</td>
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<td>✔️</td>
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</tbody>
</table>

✔️ Appropriate  ✗ Inappropriate
Smoke lobby doors

The smoke lobby door is an important part of a fire escape. Its function is to hinder the spread of smoke and fire. The structural requirements of a smoke lobby door are as follows:

1. The fire-resisting period should be at least half an hour.
2. Equipped with self-closing device. Keep the door closed but unlocked.
3. Open outwardly but shall not reduce the effective width of any fire escapes.
It is best to take precautionary measures before fires become an imminent danger. Should a fire break out, however, effective emergency contingencies may help reduce casualties and property damage, and make it easier for normal business to resume as soon as possible.

**An effective emergency plan should consist of the followings:**

- Formulation of fire instructions and evacuation procedures.
- Purchase and proper maintenance of necessary contingent equipment.
- Formation of a fire team to assist in evacuation and rescue.
- Clear indication of the locations of escape routes and gathering points.
- Posting of relevant information in conspicuous places.
Emergency contingencies

Provide training to members of the fire team, e.g.,

- First aid.
- Use of fire-fighting equipment and handling of emergencies.

General staff members shall also be trained, e.g.,

- Knowledge of fire precautions.
- Contents of fire instructions.
- Evacuation procedures.

Fire drills are essential to familiarize staff members and the fire team with evacuation procedures.

In accordance with the Guidance Notes on Fire Safety at Workplaces issued by the Labour Department, suggestions for fire drills are as follows:-

Workplaces equipped with fire alarms

- Carried out at least once a year.
- More for workplaces where there is the presence of the public.
Emergency contingencies

When there are alternative means of escape, drills shall be carried out with the assumption that one or more of such escape routes may not be available.

Workplaces without fire alarm systems

- Carried out at least once a year.
- Ensure that employees fully understand the warning method and evacuation procedures.
- New employee should receive immediate instruction on the action to take in case of fire, including a walk over all means of escape.

The fire team shall debrief the management after the fire drill with ideas for improvements.
Fire Instructions

On discovering a fire

1. Raise the alarm verbally;
2. Inform the fire team of the company;
3. Without putting oneself at risk, attack the fire with fire extinguishers or fire hoses;
4. If the fire cannot be extinguished, the fire team should sound the fire alarm and call the Fire Services Department by dialing "999".

On hearing the fire alarm

1. Close all doors and windows;
2. Switch off the equipment in use; if possible, the fire team will switch off the main switch without affecting the lighting of the premises;
3. Leave the building immediately via the escape routes under the instruction of the fire team, and gather at a predetermined point;
4. Report to the fire team.

Note

• DO NOT use lifts
• DO NOT stay to collect personal belongings
• DO NOT re-enter the building until the building is officially declared safe

Fire Wardens:
Fire Team Members:
Contact number:

Sample of fire instructions
In general, the time it takes for people to make behavioural responses prior to escape is longer than what is needed to make a safe escape.

Main points:

• It is important to reduce both the time needed for response and for escape to safety.

• Provide building occupants with sufficient information on the building layout.

• Improve building management to ensure effective operation of the building’s fire installations.

• Strengthen the implementation of fire drills.
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