



# FIRE PROTECTION

Innovations Manufacturing, Inc. (the Company)

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## Purpose

The purpose of this program is to provide information that will aid employees to prevent fires and appropriately respond in the event there is a fire.

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## Scope

This procedure applies to all Company employees all Company operated and controlled locations.

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## Responsibilities

The Safety Director:

- is responsible for developing and maintaining this procedure as well as the development and application for a training program that reflects the requirements of this program.

The Supervisors are responsible for:

- making sure workers meet the requirements of this procedure
- enforcing the provisions of this procedure.
- All employees are responsible for following these provisions.

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## Fire Prevention

**Fire, or combustion**, is when fuel reacts with oxygen to release heat energy. Combustion can be slow or fast depending on the amount of oxygen available. Combustion that results in a flame is very fast and is called burning. Combustion can only occur between gases.

The fuel must be heated to its ignition temperature for combustion to occur. The reaction will keep going as long as there is enough heat, fuel and oxygen. This is known as the fire triangle.

### Fire Triangle

The fire triangle, or combustion triangle, is the three components needed to ignite and sustain a fire. The three ingredients of a fire triangle are **heat**, **fuel** and **oxygen**.

If just one of these components is removed, the fire triangle will collapse, and the fire will be extinguished.

Let's explore these components in more detail:

#### 1. Heat

A source of heat is required in order for ignition to occur, and different materials have different 'flash points' e.g. the lowest temperature at which they ignite.

Unfortunately, combustion reactions also produce heat as they burn, further increasing the temperature of the fuel. For some types of fire, the heat can be cooled with the application of water.

#### 2. Fuel

A fire cannot begin if there is no material to burn. Homes and businesses are full of flammable materials, such as paper, oil, wood and fabrics. Any of these can serve as a fuel for a fire.

Some materials burn more easily than others. Fuels are probably the most difficult 'side' of the fire triangle to remove, so it's wise to store them appropriately to prevent them from becoming a fire hazard.

#### 3. Oxygen

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To sustain the combustion reaction, oxygen (or an oxidizing agent) is needed, as it reacts with the burning fuel to release heat and CO<sub>2</sub>. Earth's atmosphere consists of 21% oxygen, so there is plenty available to trigger a fire if the other two components are present.

Fire blankets and certain fire extinguishers remove the oxygen 'side' of the triangle by removing it or displacing it, causing suffocation and thereby ceasing the combustion reaction.

## Fire Facts

Fire normally generates three different types of hazards: heat, oxygen depletion and smoke.

**Heat:** The most obvious hazard is heat. Although the majority of fire deaths are caused by smoke, many deaths and severe injuries are caused by burns. When the temperature of skin reaches 133°F, it's associated with pain.

A room fire can range from 212°F at floor level to 2192°F at the ceiling. As temperatures rise above 260°F, skin will burn with permanent injuries, and if extremely hot air is inhaled it can scorch internal organs.

**Oxygen Depletion:** A decrease in the partial pressure of oxygen (PO<sub>2</sub>) can cause serious harm to the brain. As fire roars and grows, it consumes enormous amounts of Oxygen. I.e., a 5x5x10 fire in a 2000sqf house will normally consume all the oxygen inside the home in under 30 seconds. The brain needs a constant supply of oxygen. If the oxygen intake is interrupted for more than 3 minutes the brain can suffer irreversible damage.

**Smoke:** Smoke is all the airborne products of the pyrolysis and combustion of materials, and it can be very toxic. It's particles, gases such as carbon monoxide, volatilized organic molecules, aerosols, and free radicals are deadly when inhaled. A fire often gives off a dark, thick smoke. In a serious fire, it can be hard to see what's ahead and where you're going. Breathing in even the smallest amount of the toxic smoke can disorient a person quickly, causing them to pass out.

## How to prevent and stop the spread of fires

**Heat:** Heat usually originates from people smoking, poorly maintained machinery and equipment, hot work, neglected electrical, or arson.

Heat is occasionally inevitable to some operations in which case it is important that fuel is kept away from heat or that it's being carefully managed under a controlled environment.

**Fuel:** As previously mentioned, flammable materials (fuel) are materials that burn readily in a normal atmosphere. It's important that all these flammable materials are identified and that appropriate measures are taken to control them. You need to store these materials appropriately, and in appropriate quantities, furthermore you need to maintain good housekeeping. For extra volatile flammable materials, make sure that these are stored with extra precautions.

**Oxygen:** The air we breathe contains ~21% of oxygen. With just a small increase to say 23% oxygen – a fire will burn hotter and more fiercely. With just a little more oxygen in the air, a fire can become almost impossible to put out. The oxygen bottles should always be kept close to an exit door where firefighters can easily remove them from the building, and away from combustible materials.

## Fire Extinguishers

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### Selection and Distribution

Portable fire extinguishers shall be provided for employee use and selected and distributed based on the classes of anticipated workplace fires and on the size and degree of the hazard which would affect their use. Fire extinguishers used by the company are for three classes of fires:

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- Class A Fire Extinguishers. Use on ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber and some plastics. Travel distance for employees to any extinguisher is 75 feet (22.9 m) or less.
- Class B Fire Extinguishers. Use on flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners and propane. Travel distance from the Class B hazard area to any extinguisher is 50 feet (15.2 m) or less.
- Class C Fire Extinguishers. Use on energized electrical equipment, such as appliances, switches, panel boxes and power tools. Travel distance from the Class C hazard area to any extinguishing agent is 50 feet (15.2 m) or less.

### **Labeling Of Fire Extinguishers**

Fire extinguishers are to be mounted in easily accessible locations that are indicated by a sign that reads "Fire Extinguisher". Fire extinguishers are to be located so that no employee will ever be more than 75 feet from an extinguisher. No equipment, boxes or product may be placed (even temporarily) in the way of a fire extinguisher. Each fire extinguisher will be assigned a unique number for tracking purposes.

### **Maintenance**

All fire extinguishers should be mounted on brackets or in wall cabinets with their carrying handles placed 3-1/2 to 5 feet above the floor. All fire extinguishers shall be maintained as follows:

- Numbered to identify their proper location
- Fully charged and in operable condition
- Clean and free of defects
- Readily accessible at all times

### **Inspection, Maintenance and Testing**

All fire extinguishers are to be visually inspected by COMPANY employees monthly. All fire extinguishers are to receive an annual maintenance check by certified personnel from a fire extinguisher dealer. Fire extinguishers are to be inspected and re-charged by certified personnel after any use.

Any fire extinguisher that shows a loss of pressure during the monthly inspection will be inspected and re-charged by certified personnel. Completed fire extinguisher inspection logs will be maintained in the safety files and become a part of the safety records. They are to be maintained for 5 years.

### **Use**

In the event of a fire, one employee will get the nearest fire extinguisher and use it to attempt to put the fire out. All other employees in the immediate area will prepare to evacuate if needed. All other employees in the building need to be advised that a fire is in progress.

The employee attempting to extinguish the fire will break the safety seal on the handle and pull the pin. He will then aim his extinguisher at the base of the fire and discharge it with a sweeping motion from side to side; continuing until the fire is out or the extinguisher is emptied.

Remember that a standard fire extinguisher will be emptied in about 10 to 15 seconds. If the fire is not out when the extinguisher has been completely discharged, the employees must evacuate the area.

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## **Training and Education**

The purpose of this section is to establish training procedures which are necessary for the proper use and understanding of a fire extinguisher and incipient stage firefighting. Training will occur prior to initial assignment and at least annually thereafter.

Training will be provided annually via the Company online safety solution center in the Safety Orientation. For employees who demonstrate that they do or did not absorb the knowledge necessary to meet the requirements of this procedure, and more extensive training session will be required.

### **Initial Training Outline**

- General principles of a fire
- Hazards employed with an incipient stage fire(s)
- When to "back off" (evacuate) of an incipient stage fire(s)
- General principles of a fire extinguisher
- Hazards employed with the use a fire extinguisher
- Use of a fire extinguisher

### **Retraining**

- All workers will be retraining on an annual basis.

### **Training Documentation**

- All training will be documented, and each employee's understanding will be subject to a written test.
- Documentation will consist of; as a minimum, the employee's name, the trainer's name, the date of the training, and an outline of training provided.

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