

# RiskTopics

## Management practices: Training employees regarding fire February 2016

Do your employees have the skills to reduce their chance of causing or contributing to a fire? Is your staff prepared to take appropriate actions should a fire occur? If you have doubts, this document may help you evaluate and improve your employee training program.

Effective employee training for fire is intended to reduce the likelihood of fire due to human error. In addition, should a fire occur, effective employee training supports timely and appropriate staff actions.

This document shares guidance to support the effective education of employees regarding fire prevention and fire response.

### Introduction

This document explores employee training as a means to reduce the likelihood of a fire occurring and a means to improve response should a fire occur. Where this document refers to fire the intent is to also include explosion.

Business is where people and processes are brought together to produce results. Processes include varying degrees of fire hazards. Where the fire hazards are moderate or high, it is not enough to control only the process. It is also essential to control the employees responsible for the process. Effective training on general fire risks and specific process hazards works to minimize fires occurring due to human error.

Effective employee training continues to play a critical role should a fire occur. Employees may be able to: report fires, extinguish fires, or simply evacuate. In each case, desired employee actions can help mitigate the outcome of a fire.

Training enhances employee awareness and preparedness for managing fire hazards and is necessary for executing established policies and procedures for responding to fires. This RiskTopic reviews the primary areas where employee preparation and instruction may have the greatest impact on reducing property losses. Training employees regarding fire requires continuous education and reinforcement. With an effective training

program, informed employees are better prepared to act with appropriate behaviors for protecting property and appreciating fire risks.

## Discussion

### **General Fire Safety Training**

General fire safety training for all employees will cover:

- Fire basics such as the fire triangle, common sources of ignition, and heat transfer
- Potential fire emergencies
- Fire detection and reporting
- Fire alarm system
- Fire evacuation plans
- Manual fire extinguishment equipment

The goal of training is to help employees avoid fires and respond to fires at any point in time and in any part of a facility. Therefore training is needed for all new employees. Business with a high staff turnover or seasonal workforce should have a robust program to provide training to all employees. Refresher training is needed to maintain and update skills. Special attention may be needed for employees who change roles, especially where they will operate hazardous processes.

Training updates are needed as procedures and policies are updated or as hazardous processes change.

The most effective training includes active competency-based training with task assessments and tests.

Appendix A lists some general guidelines for training frequency.

### **Specific Fire and Explosion Process Hazard Training**

Specific training on fire and explosion hazards for employees involved with such processes will cover:

- Process fire inception hazards
- Process material fire and explosion hazards
- Process controls review
- Process operating instructions

Processes often include ignitable or explosive materials. Examples include:

- Flammable liquids
- Flammable gases
- Combustible dusts

Many processes also use equipment possessing fire or explosion ignition sources. Examples include:

- Ovens, furnaces, or boilers may include flames and hot surfaces
- Molten material vessels could fail and release hot contents
- Belt conveyors, pulverizers, and grinders are subject to frictional heat or sparking

While processes are often equipped with controls to avoid inappropriate mixtures of ignitable materials and ignition sources, control failures or human error may compromise these controls. Training offers an opportunity to provide an operator with the knowledge and experience to:

- Mitigate the consequences of control failure
- Avoid human error

Effective operator training includes all phases of a process such as:

- Start-up
- Normal operations
- Process change-over
- Normal shutdown
- Emergency shutdown

Hazardous conditions can change as processes advance through these different phases. Process change-overs may require employees to introduce different hazardous materials or to adjust process controls. These actions may compromise the effectiveness of the controls, which may have been set based on previous process conditions. Controls may be static, such as fixed fire protection systems, or variable, such as exhaust ventilation flow rates. Therefore changes in control settings have a direct impact on their effectiveness.

Process fires and explosions are often related to operator error, and these errors often occur when operators fail to follow written operating instructions. Written operating instructions are typically provided by equipment manufacturers or process designers. Equipment operators or process designers are also typically involved with the initial development and implementation of process training programs for their customers.

## **Fire response**

Fire response includes:

- Fire detection
- Fire reporting
- Incipient-stage fire extinguishment
- Evacuation

## What does employee training have to do with extinguishing a fire? Isn't that the responsibility of the fire brigade?

For the sake of property risk management, quick notification and reporting of fires serves to initiate employee evacuations, trigger fixed protection systems, and activate the fire brigade response. Effective and expedient employee evacuations are critical because fire extinguishment by the fire brigade only begins after all employees have been evacuated. A successful employee evacuation with early fire brigade notification and response will allow for the fire brigade to begin fighting the fire as soon as possible. The fire brigade response ultimately achieves the final extinguishment of the fire and determines the extent of property damage and impact to business operations.

Fire detection is the act of discovering a fire, either through employees' senses and awareness or through automatic devices. In both cases, human and automatic devices identify the symptoms of a fire, which may include: smoke, light, the smell or presence of airborne products of combustion, or heat. The tolerance level at which these fire symptoms are identified may vary, but generally, humans' sensory abilities are tuned to be highly effective at identifying fires. Training on fire detection can further generate awareness among employees to assist identifying fire conditions in early stages.

Fire reporting is the process of "sounding the alarm" once a fire has been detected. Automatic devices such as smoke and heat detectors may send an electric signal to a monitoring station or panel. Employees may initiate reporting using call boxes or contacting site security. The goal of fire reporting is to initiate the response to the fire, which may include incipient-stage extinguishment, evacuation, and response by public fire brigades.

Incipient-stage extinguishment is a response that may be incorporated in a facility's planned response to fires. Incipient-stage response involves trained employees using portable fire extinguishers and manual hose streams to attack a fire while it is in an incipient-stage. At the point where the fire continues to develop or becomes unsafe, the responding employees are trained to evacuate. The practical and theoretical training of an incipient-fire brigade's response and organization encompasses much more than use of manual fire-fighting equipment and is beyond the scope of this document. Zurich Risk Engineering recommends an evacuation strategy.



Figure 1 - Evacuation gathering location for specific departments (Photo source: Zurich)

Evacuation is the process for moving employees out of a hazardous area or fire and into an area of safety. Procedures for evacuation address all employees and depend on such factors as building layout, fire areas,

egress routes, and nearby safety spaces that may be designated as the evacuation destination. Evacuations ensure employees are able to get away from fires and allow for fire brigade response to focus on fire extinguishment, rather than on search and rescue.

In addition to training on procedures, evacuation drills are a particularly effective tool for employees and facility managers. Evacuation drills serve to educate building occupants, assist in the evaluation of emergency plans, and identify potential issues with the building's means of egress.

## Guidance

### Develop Fire Preparedness and Awareness Training

#### General Fire Training

- Provide regular training and appropriate written guidance to all employees with respect to the risk of fire.
- Include topics such as the fire triangle, common sources of ignition, heat transfer, types of fire emergencies, and elements of the Fire Emergency Action Plan.

#### Specific Hazard Training

- Conduct specific training for employees engaged in processes with an increased fire hazard.
- Include handling of hazardous materials, such as flammable liquids, flammable gases, oxidizers, or combustible dusts.
- Include machinery and process equipment, such as ovens, furnaces, belt conveyors, hydraulic systems, refrigeration systems, and boilers.
- Provide Safe Operating Procedure (SOP) instructions for processes based on manufacturer's specifications, designer protocols, and industry Best Practices. Post SOPs at each point of use and update as materials or processes are changed.
- Familiarize employees with safety precautions and controls for specific hazards. Provide training on controls and safeguard functions and their use to prevent or limit fires. Ensure controls are active and in an effective state through all phases of hazardous processes.
- Expand training to cover SOPs for equipment startup, normal operations, product changeovers, normal shutdowns, and emergency shutdowns.
- Identify shortcomings in employee training on specific hazards using the Zurich Hazard Analysis (ZHA) or other hazard analysis methodology.

### Develop a Fire Emergency Action Plan

#### Fire Reporting Procedures

- Establish methods for employees to quickly report fires using features such as telephones and manual fire alarms (also known as call buttons).
- Train all employees on the use of each fire reporting method.

## Evacuation Procedures and Drills

- Establish formal evacuation procedures.
- Determine conditions when employees should evacuate.
- Provide a description of the evacuation signal.
- Provide maps showing evacuation routes (plus alternatives).
- Establish locations where employees are to report.
- Assign evacuation leaders (and alternates) for each reporting location.
- Develop a method to record attendance at each evacuation point.
- Develop a process to collect attendance reports for delivery to the fire service upon their arrival.
- Train all employees on evacuation procedures and inform employees of whom their assigned evacuation leader is during training.
- Conduct evacuation drills on all shifts at least annually, ideally every six months. Assess the outcome of the drills and improve procedures if necessary.

## Manual Fire Extinguishment Training

- Based on the level of fire brigade organization maintained onsite, provide practical and appropriate training on fire extinguishers and manual hose usage.
- For evacuation-only facilities, conduct educational training annually for all employees.
- For structural or incipient fire brigade facilities, conduct hands-on training annually for those employees participating in the fire brigade response. Conduct educational training for all other employees.

## Maintain Training schedule and records

### Training frequencies

- Provide general fire preparedness and awareness training and instruction on the Fire Emergency Action Plan to all employees at the start of their employment.
- Provide specific hazards training for the employees engaged in the operation and maintenance of the specific processes when they are first assigned to that work.
- Training should be repeated whenever procedures are updated or the context of an employee's job changes the procedures they would follow.
- Regular refresher training should be added as appropriate based on the hazards present at the facility.

### Records

- Maintain written records and documentation of all training regarding fire.
- Utilize 'competency based' assessments with a simple questionnaire or testing at the end of the training.

- Additional training enforcement opportunities include meetings and classroom sessions, movies, demonstrations, newsletters, manuals, posters, and signs.

## Conclusion

Training employees regarding fire is essential to managing the human factors that can initiate fires, exacerbate their spread, and delay final extinguishment. General training for all employees and specific training on high fire-risk operations educates employees on the sources of fire and ways to avoid it.

Training that leads to early notification of fires and effective and quick evacuations will allow the public fire brigade to begin fighting the fire as soon as possible and minimize property losses and business interruption. The use of manual extinguishment can complement or directly support the work of the fire brigade, stop small fires before they develop, and maintain evacuation routes.

The repetition and recording of training provides a robust system increasing the likelihood that most employees are equipped to avoid and respond to fires at all times. Through training property risk management strategies are strengthened by aligning all employees with the goals of property preservation.

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## Appendix A

Some further guidance on training of employees with regard to fire is given below. Please be aware that this list is not exhaustive and has to be applied to the particular circumstances of the assessed risk. The table does not handle specific staff (maintenance, engineering, security, process engineers, fire response team etc.) that may need more intensive training in handling fire-fighting equipment.

Need for training	Practical evacuation drills	Practical training using portable extinguisher	Introduction safety training for new employees	Theoretical fire awareness training
<b>Light e.g. office</b>	Every 3-5 year for almost all employees	Every 3-5 year for 10-40% of the employees	Yes, at latest three months after starting	Every 3-5 year for 10-40% of the employees
<b>Medium e.g. metal working, warehouse, hotel</b>	Annually for almost all employees	Every 3-5 year for 30-60% of the employees	Yes, at latest three months after starting	Every 1-3 year for 30-60% of the employees
<b>High e.g. sawmill, chemical plant</b>	Annually for almost all employees	Every third year for almost all employees	Yes, at latest three months after starting	Annually for almost all employees

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