

FIRE PROTECTION AND PREVENTION



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The National Fire Protection Association (NFPA) has designated October as National Fire Prevention Month. All month long, fire departments will visit schools and neighborhoods across the country to educate the public on how to prevent fires and prepare to respond should a fire occur. This is an excellent time to refresh your workforce's knowledge of fire prevention and protection. A contractor can split their efforts into two categories: prevention and protection. Prevention is the process by which a contractor institutes policies that limit the introduction of ignition and fuel sources into the workplace. Protection is a company's response strategy to be implemented should a fire occur.

To truly understand fire prevention, you must first understand the three factors of a fire, which are normally represented by the fire triangle (Fig. 1). A fire needs all three components to ignite: heat, fuel, and oxygen. By removing any one of the components, a fire cannot ignite. Because oxygen is the one component that normally can't be removed from the workplace, we will focus on removing heat and fuel. For the purpose of this article, fuel will be categorized as three types: organic, chemical, and gaseous. Some organic fuel types are wood, paper, and cloth. They can be found in new materials or debris created by removing existing building components. Some chemical fuels found on a project are paints, primers, solvents, engine fuels, and lubricants. Flammable gases common on a construction project are propane, oxygen, and acetylene. Ideally, nonflammable materials would be substituted instead of flammable materials. However, that is not always technologically possible or economically feasible. In lieu of substitution, inventory control, housekeeping, and separation are methods used to limit fuel sources in the workplace. Inventory control is accomplished by limiting the amount of fuels stored on site. A contractor should have no more materials than required in the work area for the day's work. Excess materials should be stored in a designated area that has easy access to the work area but far enough away to keep the work area open. When performing

demolition of combustible materials, debris should be removed throughout the shift to limit the amount of rubbish which could ignite.

The Occupational Safety and Health Administration (OSHA) has a number of regulations governing the storage and use of flammable chemicals and gases. Flammable chemicals and gases cannot be stored haphazardly around a project. Chemicals in quantities in excess of 25 gal. (95 L) total, not per container, are required to be stored in a flammable chemical storage cabinet listed with Underwriters Laboratories (UL) or in a specifically designed storage room. Compressed gases cannot be stored inside any building and must be stored with the caps on (if applicable) and fixed in the upright position. Only the compressed gas cylinders required for immediate work can be in the work area and they must be transported on a cart designed to do so. All flammable chemicals and compressed gases must be labeled. There are four different labeling protocols for flammables: the Globally Harmonized System (GHS) pictogram (Fig. 2), the Department of Transportation placard (Fig. 3), the National Fire Protection Agency (NFPA) diamond (Fig. 4), and the Hazardous Material Identification System (HMIS) (Fig. 5). The numbering systems that the organizations use to identify and classify flammables DO NOT coincide with each other. While the industry is navigating through the transition into the GHS, the end user of flammable chemicals will continue to see all four of the labels. Of the four labeling systems, the GHS and HMIS were designed for employee identification of hazardous chemicals.

Removing heat (the second component of the fire triangle) can be almost as difficult as removing oxygen. Many of the processes performed on a construction site create or use heat (hot work): hot-applied waterproofing, welding and cutting, chipping concrete, temporary heaters, generators, buggies, and pressure washers all create heat, fire, or sparks. Completely removing these processes and equipment is impossible. Therefore, isolation is the method of heat removal from the triangle. When welding or cutting, an employee must be aware of where the sparks created are landing. When welding, cutting, or performing demolition in an area, the application or use of flammable chemicals must be prohibited. Equipment using engines



Fig. 1



Fig. 2



Fig. 3

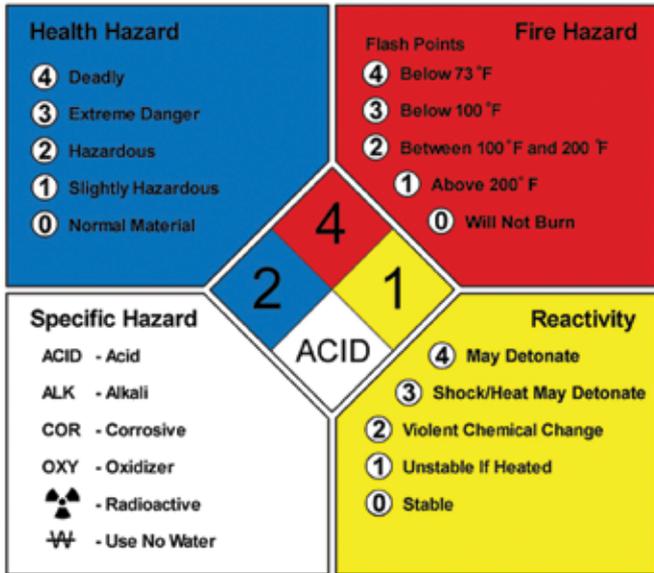


Fig. 4

that exhaust heat must be positioned in a manner which directs the heat (and fumes) to a safe location. OSHA regulation CFR1926.152(f)(3) states: “Flammable liquids may be used only where there are no open flames or other sources of ignition within 50 ft (15 m) of the operation, unless conditions warrant greater clearance.”

Whenever hot work is performed on a job site, it must be coordinated administratively by a “Hot Work Permit.” A hot work permit is essentially a checklist and notification of process very similar to a confined space entry permit. It ensures that all of the necessary safety equipment, training, and personnel are in place before hot work begins, for the duration of the operation and, if needed, a fire watch after the operation is finished. It should be filled out by the employee(s) performing the hot work. The supervisor then reviews the permit and either approves or denies the permit based on whether or not the process is safe.

Fire protection is defined as “the practice of mitigating the unwanted effects of a fire.” Once all necessary methods of prevention have been instituted, contractors must prepare a response to fire should one occur. This is accomplished by the use of suppressive systems or devices, administrative controls, and employee training. Suppressive systems and devices include fire extinguishers, sprinkler systems, stand pipes, and fire department connections to a structure’s intrinsic fire suppression system.

Fire extinguishers are required on every job site regardless of the scope of work or the types of materials that are used. It is a common misconception that a fire extinguisher is not required if flammable chemicals are not being used or stored; that is absolutely false. Some of OSHA’s location requirements for fire extinguishers are:

- A fire extinguisher rated not less than 2A shall be provided for each 3000 ft² (280 m²) of protected area. Travel distance from any point to a fire extinguisher shall not exceed 100 ft (30 m).

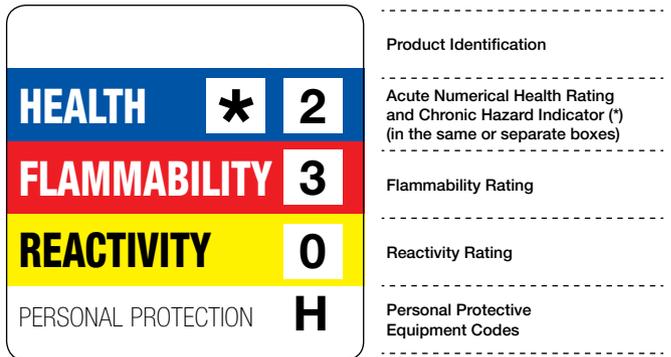


Fig. 5

- In multi-story buildings, a minimum of one fire extinguisher shall be provided for each floor, located adjacent to the stairway.
- A fire extinguisher rated not less than 10B shall be provided within 50 ft (15 m) of wherever more than 5 gal. (19 L) of flammable or combustible liquids or 5 lb (2 kg) of flammable gas are being used on a job site. This does not apply to integral fuel tanks on motor vehicles.
- At least one portable fire extinguisher rated not less than 20B shall be located not less than 25 ft (8 m), nor more than 75 ft (23 m) from any flammable storage area located outside.

Additionally, fire extinguishers should always be “conspicuously located,” inspected daily for charge (Fig. 6), inspected periodically (monthly) for condition, and recertified annually by a qualified technician.

If a building on which a contractor is working is equipped with a sprinkler system, all efforts should be made to keep the sprinkler system active while work is being performed. Sprinkler heads that are covered to prevent damage or inadvertent contact by equipment are ineffective for fire suppression. If storing materials under sprinklers, a minimum of 1.5 ft (0.5 m) of clearance must be maintained for sprinklers to disperse water



Fig. 6

properly. Buildings with sprinkler systems commonly have fire department connections outside so the fire department can “charge” the system when fighting the fire. Access to the connection must be maintained. If a fence is erected around the job site for security or other reasons, the connection must be maintained and signage must direct the fire department to its location. The same access rules apply to fire hydrants.

As with all safety policies, procedures, and protocols, employees must be trained to understand and follow them (that is, recognize the hazards associated with the work and necessary response efforts to a fire). Employees must be trained annually in how to use a fire extinguisher. National Fire Prevention Month is as good a time as any to have a retraining. This can be accomplished very simply by conducting a “toolbox talk” to review “P-A-S-S.” The acronym stands for:

- **Pull**—Pull the pin;
- **Aim**—Aim the extinguisher at the base of the fire, standing 8 to 12 ft (2.4 to 3.7 m) away;
- **Squeeze**—Squeeze the handle; and
- **Sweep**—Sweep the suppressant back and forth slowly, approaching the fire until the entire supply suppressant is exhausted.

Once a fire extinguisher is used, it must be removed from the site and recharged by a qualified technician, regardless of what the gauge reads. There is a seal in the neck of the extinguisher bottle that is breached upon use and will not reseal unless fully charged. If an extinguisher is only partially discharged, that seal will continue to leach propellant until it is empty.

The final consideration in a fire protection plan is egress. This not only applies to employees but also to building occupants. A restoration contractor works in buildings that are

occupied. If the work site infringes upon emergency exits, there are two options from which to choose. The exit either remains open with a minimum 3 ft (1 m) wide walkway allowing occupants and employees to evacuate, or the exit must be relocated with appropriate notice to the occupants, and illuminated signage provided directing occupants to the emergency exit. Notification to occupants and adding additional signage for rerouting emergency routes is not typically the responsibility of the contractor (check your contract); however, the contractor is responsible for communication to the building manager of the intent to block or capture emergency exits. For employees, there should be a clear understanding of the alarm system notifying employees to evacuate, evacuation procedures, the rally point where employees gather for a head count, and notification of emergency response for the building occupants.

In conclusion, fire protection and prevention is a discipline which transcends all industries and construction contractors. Every contractor is required to have a fire protection and prevention plan. The main parts of the plan should cover storage, use, and removal of flammable and combustible materials; labeling containers; fire-suppressive devices; employee training; and administration of the plan. Given the lives and dollars on the line, there is no better application of the axiom coined by Benjamin Franklin, who founded the nation’s first fire department in 1736: “an ounce of prevention is worth a pound of cure.”

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