RISK CONTROL BULLETIN

Fire Extinguishers

Portable Fire Extinguishers

Proper selection and placement of portable fire extinguishers can be crucial to protecting business, property, and people from a substantial fire loss. In addition to having the correct fire extinguisher available, employees need to be trained on how to use the extinguisher. A correctly classed, rated, and placed fire extinguisher is almost worthless unless there is a properly trained worker it use it. The following subheadings will describe:

- The fire triangle
- The classification of fires
- The type and rating of fire extinguishers
- Selecting the correct fire extinguisher
- Distribution of the fire extinguishers
- The training of employees
- Additional best practices for fire extinguishers

Fire Triangle

For a fire to occur there must be three specific elements involved, which are oxygen, heat, and fuel. Removal of any one of these elements (that is, one side of the triangle) will stop the fire. Fire extinguishers are designed to specifically address one of the aforementioned elements of the fire triangle for the exposure.

Oxygen makes up almost 21% of the air we breathe. The oxygen content can range from 19.5% to 23.5% before a self-contained breathing apparatus is required. However, fire can spread extremely rapidly with 100% oxygen and can also burn at levels below the 19.5% designated for humans. The oxygen does not actually burn but rather is an oxidizer, which encourages the fire to spread.

The heat side of the fire triangle most often refers to a spark, flame, or smoldering heat (i.e. a tightly packed open container of oily rags), which ignites the fire. Sparks from electrical equipment in an explosive atmosphere and sparks from defective electrical equipment are responsible for many business fires. Risk control techniques for fire prevention often address the removal of the heat/ignition source. Also, heat is most often the element of the fire triangle that is not purposely provided in the workplace.

Fuel for a fire is anything that is flammable or combustible. Look around you right now and evaluate the fire hazards of your immediate environment. Very few things in the world will not burn, given enough heat. Because so much of the raw materials to make products or to provide a service are flammable or combustible it is difficult to remove the fuel source to extinguish a fire. Risk control for this side of the Fire Triangle is to safely store everything, have an active housekeeping program, and periodically inspect the electrical system throughout the building.

Classification of Fires

Fires are classified into five different categories, A-B-C-D & K. The following is a quick reference guide to help you determine what type (s) of portable fire extinguisher (s) you may need:

CLASS "A" - Fires in ordinary combustible material such as wood, cloth, paper, rubber, and many plastics.

CLASS "B" - Fires in flammable liquids, oils, greases, tars, oil base paints, lacquers, and flammable gases.

CLASS "C" - Fires that involve energized electrical equipment where the electrical non-conductivity of the extinguishing media is of importance. When electrical equipment is de-energized, extinguishers for Class "A" or "B" fires may be used safely.

CLASS "D" - Fires in combustible metals, such as magnesium, titanium, zirconium, sodium, lithium, and potassium.

CLASS "K" - Fires in cooking media, i.e. cooking oils and fats.

Type and Rating of Extinguishers

Each class of fire requires a specifically designed fire extinguisher. Fire extinguisher manufacturers use a system of letters and numbers to help you determine the type and size fire extinguisher you need:

- Letters designate the Class of fire exposure, discussed above, that the extinguisher is suitable for. (e.g. Class "A", Class "B", etc)
- Numbers indicate the relative extinguishing effectiveness, for example, an extinguisher with a type and rating, 4-A: 20-B: C indicates the following:
  1. For Class "A" fires, it should extinguish approximately twice as much fire as a 2-A extinguisher.
  2. For Class "B" fires, it should extinguish approximately 20 times as much as a 1-B extinguisher.
  3. "C" indicates that it is suitable for use on energized electrical equipment.
- No number rating is used on Class "C" or "D" fires because:
  1. For Class "C" fires when the electricity is de-energized it reverts to a Class "A" or "B" fire so the numerical rating is based on the Class A or B requirements.
  2. For Class "D" fires involving combustible metals, the details on the extinguisher nameplate determine which exposure the extinguisher is designed to suppress.

Selecting the Correct Fire Extinguisher

To select the correct fire extinguisher for the hazard requires an evaluation of the business. Most businesses will have a need for types "A" and "C" extinguishers. Type "B" is less likely to be needed than the "A" or "C" but a good evaluation of the office, shop, maintenance, warehouse, and plant may reveal a need for the type "B" extinguisher.

Many maintenance areas as well as other departments of the business will use solvents and thinners which of course should to be stored in safety cans and/or flammable storage cabinets, refer to Safe Storage and Handling of Flammable and Combustible Liquids (Appendix E1), for more details on storage. The flammable and combustible liquids present their own special hazard and need to be attacked with the proper chemical agent. Using water on a class "B" fire could spread the fuel and make the fire worse. Select a numerical rating of at least 2-"B" for each square foot of exposed surface area of the largest vessel of flammable or combustible liquids.

Type "D" fire extinguishers are not all alike. The different combustible metals need specifically designed chemicals to suppress the fire. The manufacturer will attach to the bottle an identification plate stipulating the metal for which the extinguishing agent is designed. Find out what fire hazards are in your workplace, such as, lithium, magnesium, potassium, sodium, titanium, and zirconium and discuss your needs with the fire extinguisher distributor. The exposure may vary from day-to-day which means a "competent person" must re-evaluate the fire protection equipment each time the job task changes or at least at the beginning of each shift.

Type "K" fire extinguishers are somewhat new to the fire protection vocabulary. However, the need for the type "K" extinguisher should become obvious from an initial survey of the commercial kitchen. Excessively hot cooking media (i.e. oils and grease, usually associated with deep fryers) provides a unique fire hazard to employees and fire fighters. Again, this exposure is normally located in commercial kitchens, where cooking equipment is required to be under a hood and protected by an automatic fire suppression system meeting Underwriters' Laboratories (UL) 300 standard, effective June 30, 1998. This is the only hazard condition where the type "K" is required.

Distribution of the Fire Extinguishers

Distribution of the Fire Extinguishers is mostly common sense with some math included. National Fire Protection Association (NFPA 10, Standard for Portable Fire Extinguishers) codes have recognized the typical business exposures for Class "A" and "B" type fires and have developed tables to help determine the number, size and placement of the portable fire extinguishers, refer to the following two tables.

Class "A" Hazards

	Light (Low) Hazard Occupancy	Ordinary (Moderate) Hazard Occupancy	Extra (High) Hazard Occupancy
Minimum rating single extinguisher	2A	2A	4A*
Maximum floor area per unit of A	3000 sq. ft.	1500 sq. ft.	1000 sq. ft.
Maximum floor area for extinguisher	11,250 sq. ft.**	11,250 sq. ft.**	11,250 sq. ft.**
Maximum travel distance to extinguisher	A - 75 ft.	A - 75 ft.	A - 75 ft.

Class "B" Hazards

			Maximum Travel Distance to Extinguishers
Type of Hazard	Basic Minimum Extinguisher Rating	(ft)	(m)
Light (low)	5-B 10-B	30 50	9.15 15.25
Ordinary (moderate)	10-B 20-B	30 50	9.15 19.25
Extra (high)	40-B 80-B	30 50	9.15 15.25

Note: The specified ratings do not imply that fires of the magnitudes indicated by these ratings will occur, but rather to give the operators more time and agent to handle difficult spill fires that may occur.

Class "C" fire hazards are often contained in a single area and there is only a need for the type "C" fire extinguishers in that area. The more widely distributed flammable and combustible liquids are throughout the property the more type "C" fire extinguishers you will need. Evaluate your exposures and be liberal with the placement.

Class "D" fire hazards are usually even more contained that the Class "B" type hazards. Agreeing that the correct extinguishing agent has been selected this extinguisher must be moved from location to location to follow the hazard. Again, have a sufficient supply to protect the business.

Class "K" fires are specific to cooking media and in those specific conditions outlined in the UL 300 standard. Type "K" fire extinguishers have no numerical rating per se. However, they come in at least two sizes, a 6.0 liter (1.6 gallons) and a 9.4 liter (2&1/2 gallons). You should consult with your fire extinguisher service company to select the size appropriate for your needs. The hazard is typically limited to how many locations exist within one structure, requiring the back-up protection of a portable type K fire extinguisher to be located within 30 feet of the hazard. A rule of thumb is to have at least one six-liter (1.6 gallons) extinguisher per deep fryer.

Training

There is a direct relationship between the amount of fire that can be extinguished and the training of the user. Training on the proper use of the extinguishers in your business is good for the protection of the business and employee training is required by OSHA. The distributor, manufacturer, or local fire department should be available to arrange training by a qualified instructor. Often that training will be provided at your business. In the interim there are generally accepted techniques for proper fire extinguisher use and it goes by the acronym of P-A-S-S.

P Pull the locking pen that keeps the trigger from being activated

A Approach to with in 6-8 feet of the fire and aim the nozzle at the base of the fire

S Squeeze the trigger to dispense the extinguishing agent

S Sweep the extinguishing agent back and forth across the base of the fire

Some additional training tips about using portable fire extinguishers are:

- The fire extinguisher will only dispense the fire-suppressing agent for 10 to 30 seconds, depending upon the size of the bottle and the size of the discharge hose.
- The extinguisher will dispense a stream averaging 8 to 10 feet in length.
- Do not walk beyond a fire from an exit egress area just to get to a fire extinguisher, out of respect for the fire that might block your path for exiting the building.
- Do not walk on an area where you have extinguished a fire in case the fire re-ignites or because the structure may collapse.

Tips concerning Class "D" fires.

- Select the proper extinguisher with the extinguishing chemical designed for the combustible metal on which your are working.
- Placement of these extinguishers is to be close at hand for quick access. Unless your entire shop/plant has combustible metals throughout, placement is restricted to the local area of exposure.
- Do not disturb the fire suppression chemical which has been applied to the burning metal until the metal has cooled (different metals cool at different rates, consult the Material Safety Data Sheet for the metal on which work is being performed.

The National Fire Protection Association (NFPA) Fire Protection Handbook offers more details on Portable Fire Extinguishers, including selection, distribution, and training. NFPA fire code 10 "Standard for Portable Fire Extinguishers" reviews the specific details for all the currently acceptable fire extinguishers and their usage. For companies with special fire hazards or an elevated fire load, it is more important that extra protection be afforded.

Special Requirements and Training Needs For Safe Use of Class K Extinguishers

Serious injury can occur to an untrained operator who tries to extinguish a cooking oil fire by inserting the application wand of the extinguisher directly into and under the surface of the burning oil. This can have serious results as it causes the hot oil to literally explode, showering the user with scalding hot oil.

The reason this happens is that the media content of wet chemical extinguishers contains between 40-60% water whose volume increases approximately 2000 times when it flashes into steam.

Tips concerning Class "K" fires.

- Portable fire extinguishers are only a back up to the permanently installed automatic fire suppression hood system.
- Apply the extinguishing agent to the surface of the grease or oil only.
- Do not allow the fire extinguisher wan or anything else to penetrate the surface of the burning grease or oil.
- Wait for at least 20 to 30 minutes or until the fire department shows up before the clean up begins.
- Disturbing the surface membrane formed on the top of the hot grease or oil could expose the heat and fuel to oxygen and a flare up could occur.
- Allowing any water or wet objects to come in contact with the hot grease or oil can cause an explosion.
- Distribute the extinguisher (s) with in 30 feet of the potential fire source.

One manufacturer, Badger Fire Protection has a video entitled Kitchen Defender, showing this accident actually happening. For more details refer to the Property - Additional Resources List (Appendix E10).

Additional Best Practices for Fire Extinguishers:

- Periodically re-evaluate the fire exposure and the number, class, and size of extinguishers needed and available.
- Hang (via a bracket) on a permanent structure in a readily accessible and conspicuous location.
- Distribute them throughout the building. Refer to the subheading titled Distribution of Fire Extinguishers.
- Maintain accessibility, do not block or hang anything on them or cover them.
- Serviced annually by a licensed fire extinguisher company.

- Have them inspected weekly by the area supervisor to assure they are charged and ready for use.
- Replace discharged or damaged extinguisher as soon as possible
- Get the fire extinguisher bottles visually and hydrostatically tested by a licensed fire extinguisher company per requirements from the U.S. Department of Transportation.

This publication is not part of your policy. This publication is provided for informational purposes only and does not attempt to identify all potential issues, situations, hazards, or remedial actions. FCCI Insurance Group* and its affiliates and subsidiaries are making no representations and providing no legal advice and shall not be liable for any loss, injury, death, damage or expense arising out of the use of this information. You are solely responsible for complying with all relevant laws, including any changes in the law, and for the safety and protection of your operations.

* The FCCI Insurance Group includes the following insurance carriers: FCCI Insurance Company, FCCI Commercial Insurance Company, National Trust Insurance Company, Monroe Guaranty Insurance Company, and Brierfield Insurance Company.