Fire class

Fire class is a term used to denote the type of fire, in relation to the combustion materials, that has (or could be) ignited. This affects the type of suppression or extinguishing materials that can be used.[1] Class letters are often assigned to the different types of fire, but these differ between territories. There are separate standards in the United States, Europe, and Australia.

Contents

Fire types

Image	Description	Europe (European Standard EN 2)	United States	Australian	Suitable suppression
	Combustible materials (wood, paper, fabric, refuse)	Class A	Class A	Class A	Most suppression techniques
	Flammable liquids	Class B	Class B	Class B	Inhibiting chemical chain reaction, such as dry chemical or Halon

Image	Description	Europe (European Standard EN 2)	United States	Australian	Suitable suppression
	Flammable gases	Class C	Class B	Class C	Inhibiting chemical chain reaction, such as dry chemical or Halon
	Flammable metals	Class D	Class D	Class D	Specialist suppression required
	Electrical fire	*not classified (formerly Class E)*	Class C	Class E	As ordinary combustibles, but conductive agents like water not to be used
	Cooking oils and fats	Class F	Class K	Class F	Suppression by removal of oxygen or water mist

Ordinary combustibles

Class A fires consist of ordinary combustibles such as wood, paper, fabric, and most kinds of trash. They may be extinguished by water, wet chemical suppression, or dry powder.[2][3]

Flammable liquid and gas

These are fires whose fuel is flammable or combustible liquid or gas. The US system designates all such fires "Class B".[3] In the European/Australian system, flammable liquids are designated "Class B" having flash point less than 100 °C, while burning gases are separately designated "Class C". These fires follow the same basic fire tetrahedron (heat, fuel, oxygen, chemical reaction) as ordinary combustible fires, except that the fuel in question is a flammable liquid such as gasoline, or gas such as natural gas. A solid stream of water should never be used to extinguish this type because it can cause the fuel to scatter, spreading the flames. The most effective way to extinguish a liquid or gas fueled fire is by

inhibiting the chemical chain reaction of the fire, which is done by dry chemical and Halon extinguishing agents, although smothering with CO_2 or, for liquids, foam is also effective. Halon has fallen out of favor in recent times (except for aircraft fire extinguishment systems) because it is an ozone-depleting material; the Montreal Protocol declares that Halon should no longer be used. Chemicals such as FM-200 are now the recommended halogenated suppressant.

A carbon dioxide fire extinguisher rated for flammable liquids and gasses

Electrical

Electrical fires are fires involving potentially energized electrical equipment. The US system designates these "Class C"[3]; the Australian system designates them "Class E". This sort of fire may be caused by short-circuiting machinery or overloaded electrical cables. These fires can be a severe hazard to firefighters using water or other conductive agents, as electricity may be conducted from the fire, through water, to the firefighter's body, and then earth. Electrical shocks have caused many firefighter deaths.

Electrical fire may be fought in the same way as an ordinary combustible fire, but water, foam, and other conductive agents are not to be used. While the fire is or possibly could be electrically energized, it can be fought with any extinguishing agent rated for electrical fire. Carbon dioxide CO_2, NOVEC 1230, FM-200 and dry chemical powder extinguishers such as PKP and even baking soda are especially suited to extinguishing this sort of fire. PKP should be a last resort solution to extinguishing the fire due to its corrosive tendencies. Once electricity is shut off to the equipment involved, it will generally become an ordinary combustible fire.

In Europe, "electrical fires" are no longer recognized as a separate class of fire as electricity itself cannot burn. The items around the electrical sources may burn. By turning the electrical source off, the fire can be fought by one of the other class of fire extinguishers.

Metal

Class D fires involve combustible metals - especially alkali metals like lithium

and potassium, alkaline earth metals such as magnesium, and group 4 elements such as titanium and zirconium.[2]

Metal fires represent a unique hazard because people are often not aware of the characteristics of these fires and are not properly prepared to fight them. Therefore, even a small metal fire can spread and become a larger fire in the surrounding ordinary combustible materials. Certain metals burn in contact with air or water (for example, sodium), which exacerbates this risk. Masses of combustible metals do not usually represent great fire risks because heat is conducted away from hot spots so efficiently that the heat of combustion cannot be maintained. In consequence, significant heat energy is required to ignite a contiguous mass of combustible metal. Generally, metal fires are a hazard when the metal is in the form of sawdust, machine shavings or other metal "fines", which combust more rapidly than larger blocks. Metal fires can be ignited by the same ignition sources that would start other common fires.

Care must be taken when extinguishing metal fires. Water and other common firefighting agents can excite metal fires and make them worse. The National Fire Protection Association recommends that metal fires be fought with dry powder extinguishing agents that work by smothering and heat absorption. Different metals require different agents and for a particular metal agents cannot necessarily be substituted for one another. The most common agents are sodium chloride granules and graphite powder. In recent years, powdered copper has also come into use. These *dry powder* extinguishers should not be confused with those that contain *dry chemical* agents. The two are not the same, and only dry powder should be used to extinguish a metal fire. Using a dry chemical extinguisher in error, in place of dry powder, can be ineffective or actually increase the intensity of a metal fire.

Cooking oils and fats (kitchen fires)

Class K fires involve unsaturated cooking oils in well-insulated cooking appliances located in commercial kitchens.[2]

Fires that involve cooking oils or fats are designated "Class K" under the American system, and "Class F" under the European/Australian systems. Though such fires are technically a subclass of the flammable liquid/gas class, the special characteristics of these types of fires, namely the higher flash point, are considered important enough to recognize separately. A special class K extinguisher will safely smother the fire by turning the oil into a foam. A water mist can also be used to extinguish such fires. As with Class B fires, a solid stream of water should never be used to extinguish this type because it can

cause the fuel to scatter, spreading the flames. Appropriate fire extinguishers may also have hoods over them that help extinguish the fire. Sometimes fire blankets are used to stop a fire in a kitchen or on a stove.

Laboratory simulation of a chip pan fire: a beaker containing wax is heated until it catches fire. A small amount of water is then poured into the beaker. The water sinks to the bottom and vaporizes instantly (*boilover*), ejecting a plume of burning liquid wax into the air.

See also

- Fire extinguisher

References

1. *Fire Detection and Suppression Systems* (Third ed.). Stillwater, OK: International Fire Service Training Association. 2005. p. 9. ISBN 0-87939-267-3. OCLC 62785313 (https://www.worldcat.org/oclc/62785313).
2. *Fire Detection and Suppression Systems* (Third ed.). Stillwater, OK: International Fire Service Training Association. 2005. p. 10. ISBN 0-87939-267-3. OCLC 62785313 (https://www.worldcat.org/oclc/62785313).
3. "Choosing and using fire extinguishers" (https://www.usfa.fema.gov/prevention/outreach/extinguishers.html). *U.S. Fire Administration*. 2017-12-12. Retrieved 2019-05-30.

External links

- Classification of Portable Fire Extinguishers (https://web.archive.org/web/20080401035246/http://www.osha.gov/doc/outreachtraining/htmlfiles/extmark.html), Occupational Safety and Health Administration
- Evacuation Plans and Procedures eTool (http://www.osha.gov/SLTC/etools/evacuation/portable_about.html), Occupational Safety and Health Administration
- Information on Fire Extinguishers (http://www.firesafe.org.uk/html/fsequip/exting.htm), The Fire Safety Advice Centre
- For Fire Extinguishers (https://web.archive.org/web/20080508224118/http://www.fireservice.com.au/extinguisher.html), Wollongong Extinguisher Service-Australia