

newsletter

Powder extinguisher

When fire breaks out, the first priority is taking immediate steps to extinguish it. Acting quickly is the only way to prevent the fire from getting out of control. However, selecting the right extinguishing agent is also essential. Choosing the wrong one can lead to consequential losses in excess of the damage caused by the fire alone.

Introduction

Selecting the right type of extinguishing agent plays an important role in fire fighting. In the event of a fire, immediate action is crucial and there will not be time to consider the suitability of an extinguishing agent before using it. It is therefore important to anticipate possible scenarios when designing fire extinguishing systems, and to make the right choice in advance of any emergency occurring.

Types of extinguishing agents

In portable extinguishers various extinguishing agents are typically used:

Water – the first and for a long time only known extinguishing agent. Today water is used in sprinkler systems, deluge systems and water mist systems. It is also used with additives such as foam agents (AFFF) or viscosity reducers, which improve the effectiveness or applicability of the extinguishing system.

Gas – the best known extinguishing gases are carbon dioxide (CO₂), inert gases (eg N₂) and halogenated hydrocarbons (eg halon). Hand-held fire extinguishers currently only use CO₂.

Dry powder – currently the most frequently used agent in hand-held extinguishers. The range of different dry powders is relatively small. The most common type, suitable for class A, B and C fires and for electrical appliances, contains monoammonium phosphate. The powder decomposes when exposed to the flames and produces free radicals that interrupt the combustion process. The substance melts and forms an insulating layer over the burning material, weakening the flames. Other common powders are based on sodium hydrocarbonate or potassium carbonate (classes B and C). Combinations of sodium hydrocarbon and urea are used to extinguish liquid fuel fires. There are also special powders (class D) for tackling fires involving metals that would react with all other extinguishing agents. They are based on either sodium chloride salt, graphite or copper.

Foam – is the preferred extinguishing agent for class B substances (plastics, oils, fats etc.). For the unique requirements in case of kitchen fires (deep fryers, cooking oil, class F) specific foam agents are used in handheld extinguishers and in so called ANSUL fixed fire fighting systems respectively.

Characteristics of dry powder

Owing to their range of application, effectiveness and low price, dry powder extinguishers are the most popular type. They are found for example in offices, libraries, warehouses and production facilities.

However, because of the disadvantages associated with powder as an extinguishing agent, preferably this type of extinguisher should only be used outside. Dry powders are highly effective, but the potential consequential loss brought about by the substance itself must also be considered. This is especially relevant where the goods involved could become contaminated, eg electronic products, magnetic devices, measuring or controlling systems, medical devices, food or medicines.

For example, if just a few kilograms of fine microparticles (measuring approx 0.05mm) were released into the direct vicinity of computer equipment, the computer cooling systems would be destroyed, causing damage to rotating parts (eg fans), drives or power supply/power unit.

If the powder particles are large enough they will block the filters, rendering them useless. As a consequence the operating temperature will rise and, in a favourable scenario, cause a system crash.

Even when the scope of direct property damage is limited, consequential loss can take on significant dimensions, eg in the case of business interruption. Examples include temporary power or production plant shutdowns caused by control failures, disruptions to control systems in high bay warehouses following loss of data and security system failures.

Dry powder can also interfere with sensors used in measuring instruments, can block detectors, contaminate food or medicines and damage textiles, leather and other products sensitive to dust.

The use of dry powder should especially be avoided in small rooms or confined areas (eg within buildings). If inhaled, the released powder can cause those working in the area to suffocate.

When combined with combustible products, dry powder can also accelerate corrosion of electronic components and, in time, lead to a shutdown.

Professional damage restoration targeted at electronic components can reduce a loss, but preventing damage by installing suitable extinguishers is clearly a more favourable option.

Examples

Fire in a pharmaceutical warehouse

The fire was discovered immediately and employees extinguished it using hand-held extinguishers. The pharmaceutical products (both finished products and raw materials) stored in the warehouse were contaminated with dry powder and could no longer be used. The goods had to be disposed of and the warehouse decontaminated. The damage caused by the fire amounted to EUR 25 000; a further EUR 250 000 was spent on decontamination.

Fire in a department store

A fire involving a burning clothes rack was quickly extinguished by employees using a dry powder extinguisher. As the shop floor was based on an open design, the dry powder was sprayed across a wide area. As a result it contaminated most of the other goods. Total damage amounted to EUR 1.5m, but the proportion of this directly attributable to fire damage was negligible.

Fire in an electronics store

6 extinguishers, each containing 12kg of dry powder, were used to put out a fire in an electronics store. The fire was extinguished so quickly that the sprinkler system was not even activated. Subsequent analysis showed that if the sprinkler system had been activated, the damage would have been just 10% of that actually incurred.

Information for the underwriter

The choice of extinguishing agent should always be made according to the needs of the particular situation. From a risk engineering perspective, it is recommended that alternatives are found to dry powder extinguishers, particularly in small rooms or confined areas. This is particularly important for the following area types:

- IT centres housing expensive electronic equipment and/or important data
- Control centres for processes, storage or security
- Ventilation systems
- Areas close to devices sensitive to dust, eg medical equipment
- Confined areas (because of the risk of suffocation)
- Areas used for the production or storage of food or medicines
- Shops and department stores (food, clothing and furniture departments)
- Offices, archives and libraries

Using an unsuitable extinguishing agent can lead to consequential loss well in excess of the actual fire damage. Choosing the right type of extinguishing agent will avoid this loss. An analysis of such scenarios should be included as part of a risk assessment.

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