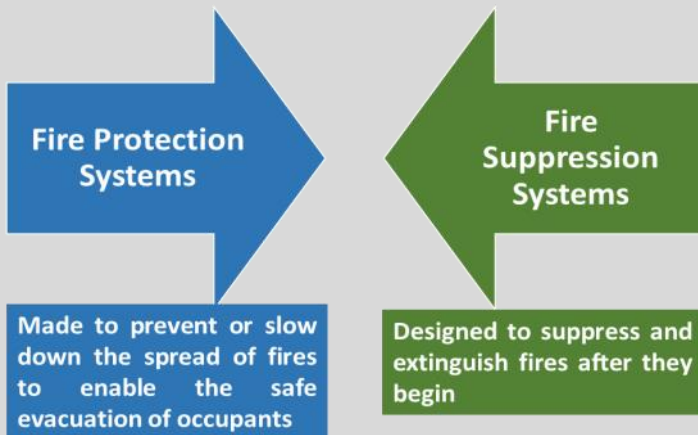




Basics of Automatic Fire Suppression

INTRODUCTION

Fire Protection vs. Fire Suppression

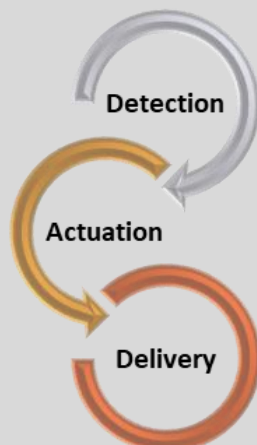


What is Automatic Fire Suppression?

Automatic fire suppression is a system that can detect and extinguish (or contain) a fire without relying on human intervention.

How it Works?

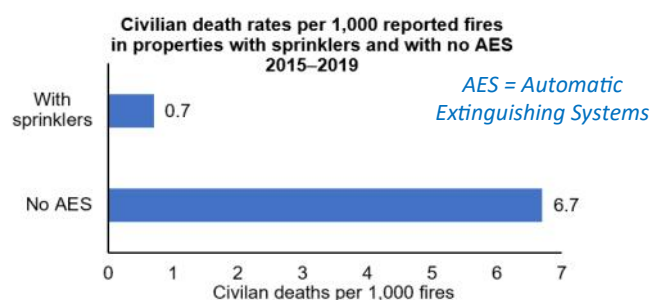
Detection: The built-in components detect the fire as early as possible by identifying the presence of flame, smoke, or heat, then,
Actuation: will initiate an alarm and activation of the system, then,
Delivery: the delivery of the extinguishing agent (e.g., water, inert gas, etc.) to control or suppress the fire.



Benefits of Automatic Fire Suppression ?

<p>RAPID RESPONSE As soon as the system detects a potential fire, it activates immediately.</p>	<p>NO HUMAN INTERVENTION Eliminates the potential human error during activation.</p>
<p>CONTINUOUS PROTECTION 24/7 protection - whether during operation hours or in the middle of the night.</p>	<p>CHOICE OF SUPPRESSANTS From water and foam to clean agents and gases for specific environments.</p>
<p>REDUCED DAMAGE By detecting and fighting fires in their early stages, it help limit the damage caused by fire.</p>	<p>ENHANCED SAFETY Reduce the need for individuals to combat fires manually, thus minimizing the risk of injury.</p>
<p>INSURANCE BENEFITS Possibility of reduced insurance premiums, as it decreases potential loss risks.</p>	<p>ENVIRONMENT FRIENDLY Minimal environmental impact by reduced harmful emissions that protect the ozone layer.</p>
<p>COMPREHENSIVE COVER It covers hidden or hard-to-reach areas.</p>	<p>COST EFFICIENT Initial investment for it is high, but potential savings in avoided damages & interruptions</p>

U.S. Experience with Sprinklers



TYPES OF AUTOMATIC FIRE SUPPRESSION

1. WATER-BASED SPRINKLER SYSTEM

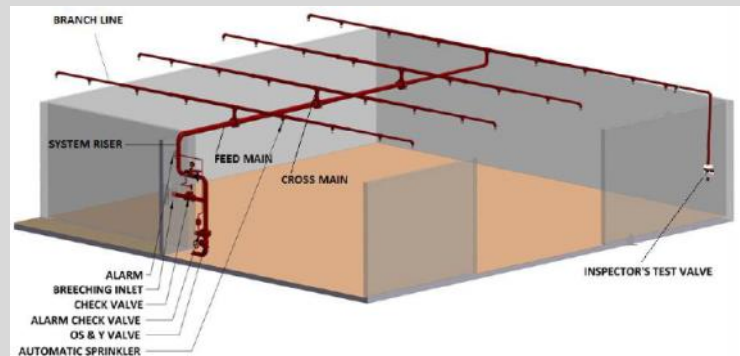
Water is the most widely used and available fire-extinguishing agent. Water is effective in fire suppression. The techniques and mechanisms using water and its heat absorbing, cooling and fire extinguishing properties to fight and extinguish fires.



A water-based fire suppression system uses a pipe networks to distribute water to connected fire sprinkler bulbs

1.1. Automatic Sprinkler System

Operates (bursts) automatically when its heat-activated element is heated to its thermal rating or above, allowing water to discharge over a specified area.



1.1.1. Wet-Pipe Sprinkler System

The system fills the sprinkler pipes with pressurized water that is immediately released from the sprinkler heads when a fire happens.

Normally found in high-rise buildings, hotels, restaurants, etc.

1.1.2. Dry-Pipe Sprinkler System

The system fills the sprinkler pipes with air or nitrogen rather than water, to prevent freezing of water in colder temperatures. The air pressure is reduced when a fire occurs, and a valve opens to let water flow into the sprinkler pipes to put out the fire.

Normally used in cold climates and in cold storage rooms with freezing temperatures.

1.1.3. Pre-Action Sprinkler System

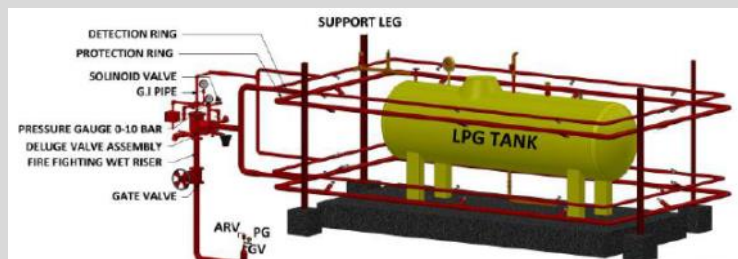
The systems contain a pre-action valve that is electrically activated when heat, smoke, or flames are present. The sprinkler heads also need to be activated by heat sensing before water starts flowing over the affected area. This two-stage process avoids accidental discharge of water thus preventing catastrophic damages in the contents.

Normally used in battery charging rooms, UPS rooms, lift machine rooms, server rooms, and telephone rooms.

1.1.4. Deluge Sprinkler System

The systems have unpressurized dry piping with open sprinkler heads. Once the deluge valve is activated by heat or smoke detection, water flows through all of the sprinkler heads at once.

Normally used in bulk storage tanks containing flammable liquids like LPG, propane. Also used in transformer rooms, service or transport tunnels, and cooling towers.



1.2. Water Mist System

It produce ultra-fine mist, which absorbs heat, rapidly cooling the fire's environment. The mist also displace the surrounding oxygen which is essential for combustion process.

Ideal for transformer rooms, machinery rooms, marine service rooms, combustion turbines, industrial oil cookers, cable spread areas, computer room raised floors, road and service tunnels, and chemical fume hoods.

1.3. Foam Sprinkler System

The system harness the combined power of water and formulated foam concentrates to produce a dense and enveloping foam solution when unleashed upon a fire, acts like a protective shield, rapidly spreading across the fire's surface.

Ideal for manufacturing and storage of flammable and combustible liquids, generator rooms.

TYPES OF AUTOMATIC FIRE SUPPRESSION

2. GAS & CHEMICAL BASED SUPPRESSION SYSTEMS

Gas extinguishing technology is based mainly on the principle of removing oxygen. By introducing a gaseous extinguishing agent into the room's atmosphere the oxygen content is reduced to the point where the combustion process is halted. The gas extinguishing process uses either inert or chemical gases.

2.1. Gaseous Systems

Gaseous systems like FM-200 or Novec 1230, alongside inert gases like argon or nitrogen, are sophisticated fire deterrents. Their operation principle revolves around two key strategies: heat absorption and oxygen displacement. This makes them especially valuable in data centers where water can severely damage electronic equipment. Their deployment ensures fires are quelled without leaving residue or causing water damage.

2.1.1. Clean Agent System

The systems' extinguishing agents are safe for both people and the environment.

Ideally used in electrical rooms, control rooms, data center server farms, battery charging rooms, UPS rooms, telephone rooms, and server rooms.



2.1.2. Inert Gases

Nitrogen, helium, and argon are inert gases that are effective fire suppressants. They can extinguish flames by suffocating, displacing, or decreasing oxygen levels within an enclosure.

Ideally used in libraries, data centers, museum and galleries.

2.2. Carbon Dioxide (CO₂) System

The system quickly put out a variety of Class A, B, and C fires. Systems for high-pressure and low-pressure CO₂ suppression may cover everything from large, open spaces to a single piece of equipment. Due to CO₂'s lack of color, odor, and electrical conductivity, there is little to no clean-up required after activation. There's also no chemical residue that can harm delicate equipment. CO₂ suppression systems are typically used in areas where few employees are stationed.

Normally installed in data center server farms, marine engine rooms, rolling mill processes, generator and turbine rooms.

2.3. Dry Chemical Suppression System

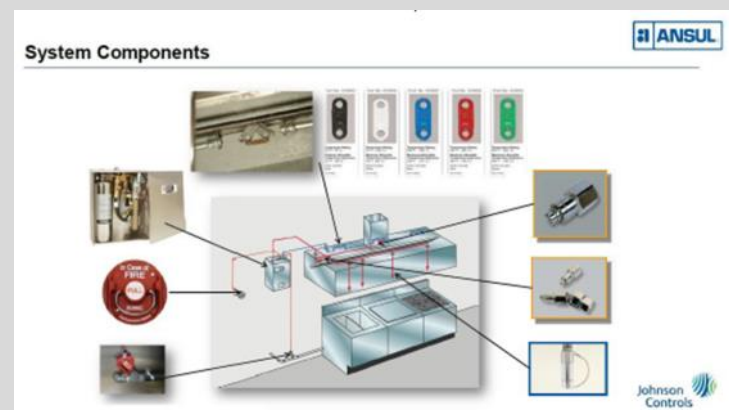
The system uses dry chemical powder to put out fires instead of inert gas or chemical clean agents. These dry chemicals are typically sodium bicarbonate.

Normally used in all types of flammable liquid and gas fires (Class B) and for fires involving energized electrical equipment (Class C), cooking oils and fats.

2.4. Wet Chemical Suppression System

The systems effectively put out flames where the liquid spray instantly reacts with the fats and oils on a burning surface to produce foam that cools the area and prevents a fire from reigniting. After activation, the affected area is easier to clean than dry chemicals.

Normally used in commercial kitchens usually installed in kitchen hoods above stoves, ovens, deep-fat fryers, and grilling areas.



AUTOMATIC FIRE SUPPRESSION APPLICATIONS

MANUFACTURING & INDUSTRIAL



Presence of machinery, combustible & flammable materials, and various processes with fire hazards

WAREHOUSING AND STORAGE



Storing of combustible materials and Dangerous Goods (e.g., flammable materials, and sometimes explosive, toxic and reactive chemicals)

HOSPITALITY & RETAIL



Malls, hotels, restaurants, and entertainment venues with presence of commercial kitchens which is the normal cause of fire in these establishments

RESIDENTIAL & OFFICE



For the safe evacuation of dwellers and occupants especially on high-rise buildings due to challenges in firefighting and fire access

EDUCATION



Schools, universities, and other educational institutions for the safe evacuation of students and staff

FINANCIAL INSTITUTIONS



Banks and financial institutions to protect important documents, cash holdings, and digital equipment

DATA CENTERS



Vast arrays of servers and networking equipment to prevent loss of digital data, digital documents and information

HEALTHCARE



Hospitals, clinics, and other healthcare facilities to protect patients, expensive medical equipment, and critical data

OIL AND GAS



Refineries, drilling platforms, and storage facilities are at high fire risk due to the presence of high volume of flammable and combustible liquids

TRANSPORTATION



Bus terminals, railway stations, and airports to protect infrastructure and the public commuters

AEROSPACE



Aircraft hangars and manufacturing facilities due to presence of flammable materials especially jet fuel

MARINE



Ships and marine facilities, especially those carrying or processing flammable cargo

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IMAGE CREDITS:

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