



गृह मंत्रालय
MINISTRY OF
HOME AFFAIRS



Accidental Fires & Their Management

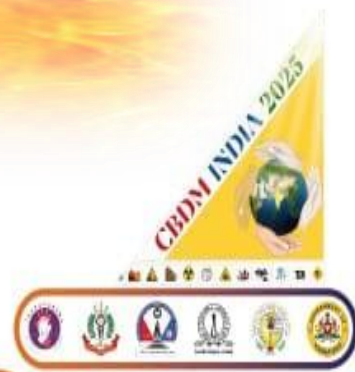
[Urban, Industrial & Wild]



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Overview.....

- Accidental Fires- natural and man-made cause.
- Significant threats- human safety, infrastructure, environment.
- Fire Risk Assessment-Urban, Industrial Safety & Wildfire Mitigation
- Interface: Wildland-Urban Interface (WUI)
- Emergency Response & Strategies
- Prevention and management of accidental fires
- Integrating case studies and highlighting best practices.
- Disaster prevention and management.



FIRE



IS IT SO INNOCENT?

Accidental Fires- **TOO DANGEROUS ?**



Accidental Fires- Natural or/and Man-made

Accidental Fires

Significant threats- human safety, infrastructure, environment



Oil train disaster ,Canada ,Killed 80



WHAT FIRE CAN DO ?

11.09.2001



Towers would have been standing today ! (if there were no fires) Collapse of WTC



Industrial Disasters.....



Jaipur Fire

Causes of Urban Fires

- Electrical malfunctions.
- Improper storage of flammable materials.
- Negligence in fire safety practices.
- Urban congestion and unplanned growth.
- Lack of fire-resistant infrastructure.



Urban -Challenges in Fire Management

- Limited firefighting resources and infrastructure.
- High population density complicating evacuation.
- Ineffective enforcement of fire safety regulations.
- Inadequate public awareness and participation.
- Difficulty in accessing congested urban areas.



Urban /Industrial-Strategies for Effective Management

- Strengthening fire safety regulations and enforcement
- Enhancing firefighting infrastructure and training
- Promoting public awareness and community participation
- Integrating urban planning with fire safety considerations
- Establish a National Urban Fire Safety Framework
- Enhance technological integration in fire safety systems
- Regular fire audits and safety drills



Urban /Industrial-Strategies for Effective Management

- Emergency response plans.
- Advanced firefighting technologies.
- Collaboration across agencies and communities.
- Risk assessments and compliance audits.
- Adopting fire-resistant infrastructure.
- Foster collaboration among stakeholders including local.



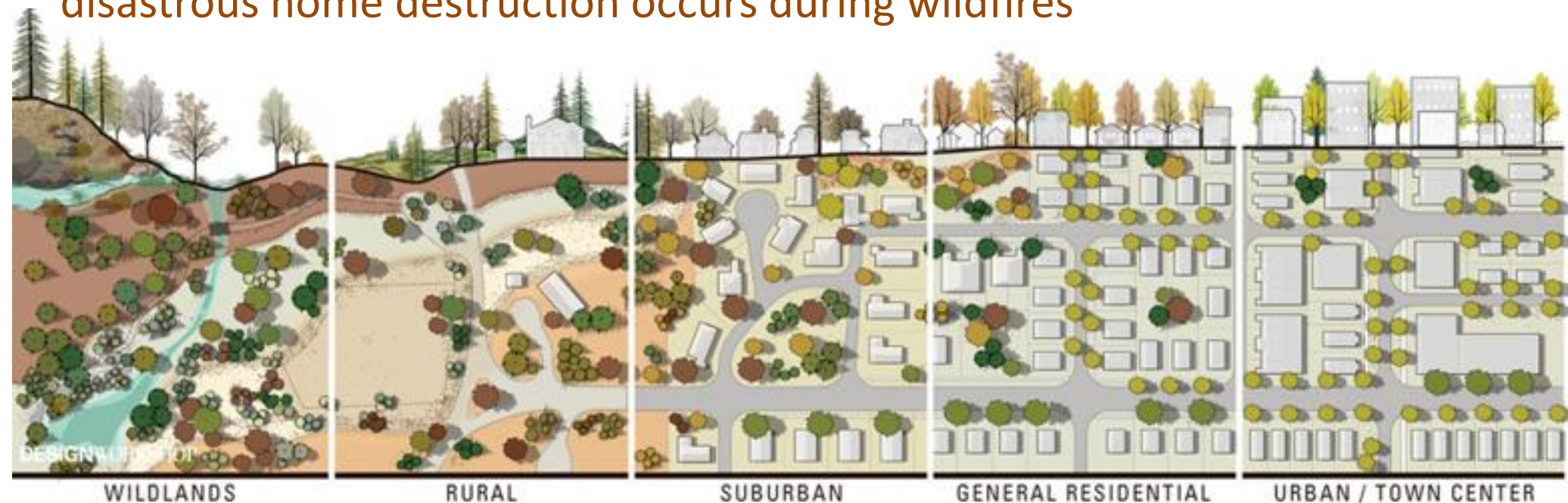
Wild Fires

- 54.4% of India's forests are affected by occasional fires.
- 7.49% experience moderate fires; 2.4% face high fire incidence.
- Global increase in fire season length due to climate change.
- Major fire-prone areas: Deccan Plateau, Northeastern India.
- Economic and ecological damages are often underreported.



Wildland-Urban Interface (WUI)

- We must first understand how wildfires cause home ignitions, and how disastrous home destruction occurs during wildfires



- If homes are ignition-resistant and numerous home ignitions do not occur structure protection effectiveness is greater for home ignitions that do occur, thereby preventing disastrous losses.

Wildfire are not quantified in terms of loss, but rather Net Value Change (NVC)

Forest Regeneration

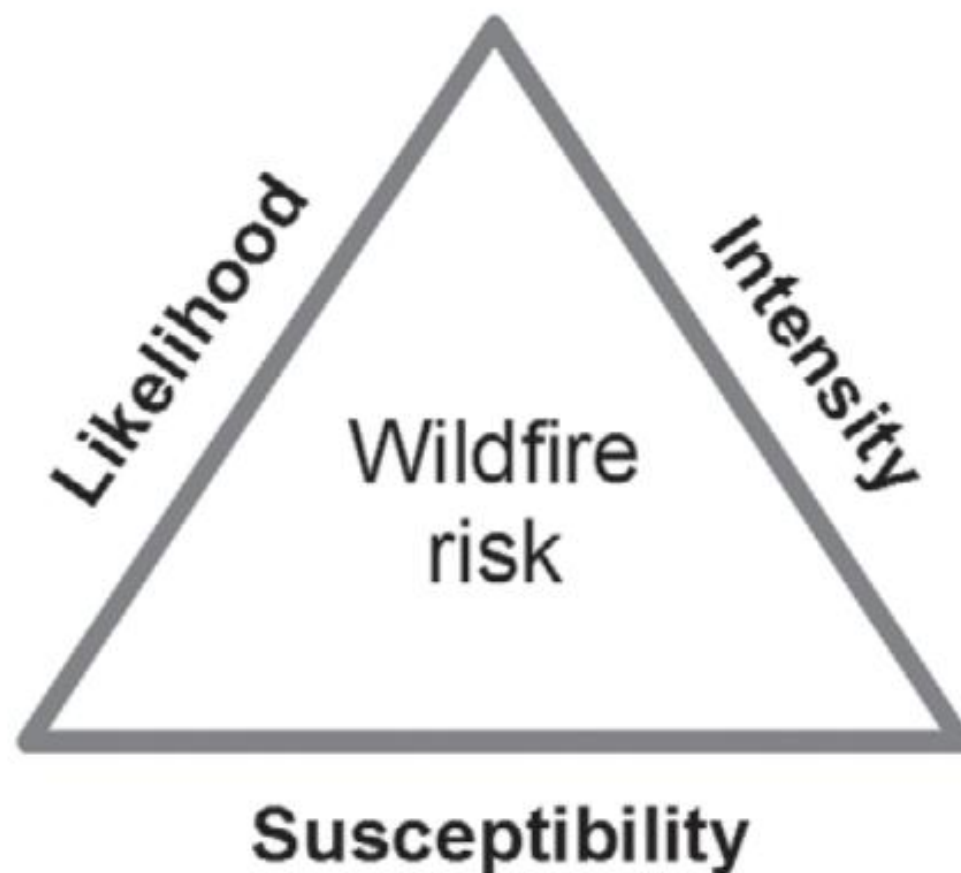
Seed Germination: Some plant species, like the lodgepole pine, require fire to release seeds from their cones.

Nutrient Cycling: Fires break down organic matter, releasing nutrients like nitrogen and phosphorus into the soil, enhancing fertility.

Clearing Undergrowth: Fires eliminate dense underbrush, reducing competition and allowing sunlight to reach the forest floor, fostering growth.



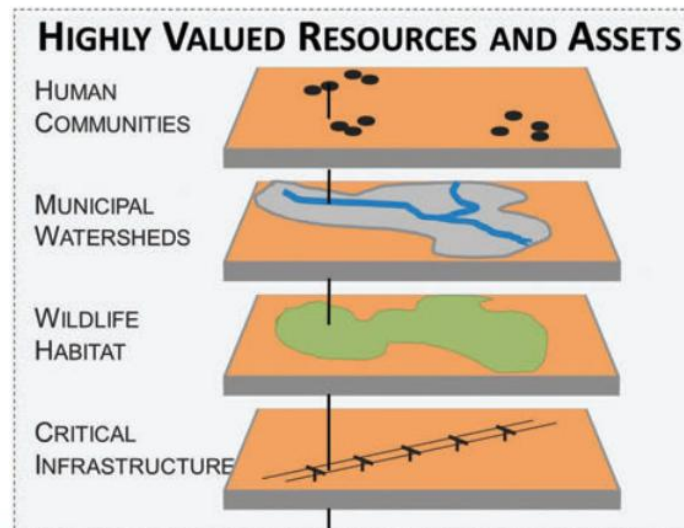
Highly Valued Resources and Assets (HVRA)



Assessment of risk to a particular HVRA, or a suite of HVRA, and their spatial intersection with wildfire likelihood and intensity

Wildfire Risk Analysis

- How large are fires likely to grow?
- Which HVRAs have the greatest exposure to wildfire hazard?
 - What are the likely effects to HVRAs of fire at different intensity levels?
- Where might fires cause harm/damage, and where might they lead to benefits?
- How is wildfire risk distributed across the landscape?
- Which areas are most likely to experience loss, how much loss, and to what HVRAs?



Importance of Wildfires

Fires clear out dead plant matter that builds up over time. Without fires, the forest becomes too dense and sunlight cannot get in.

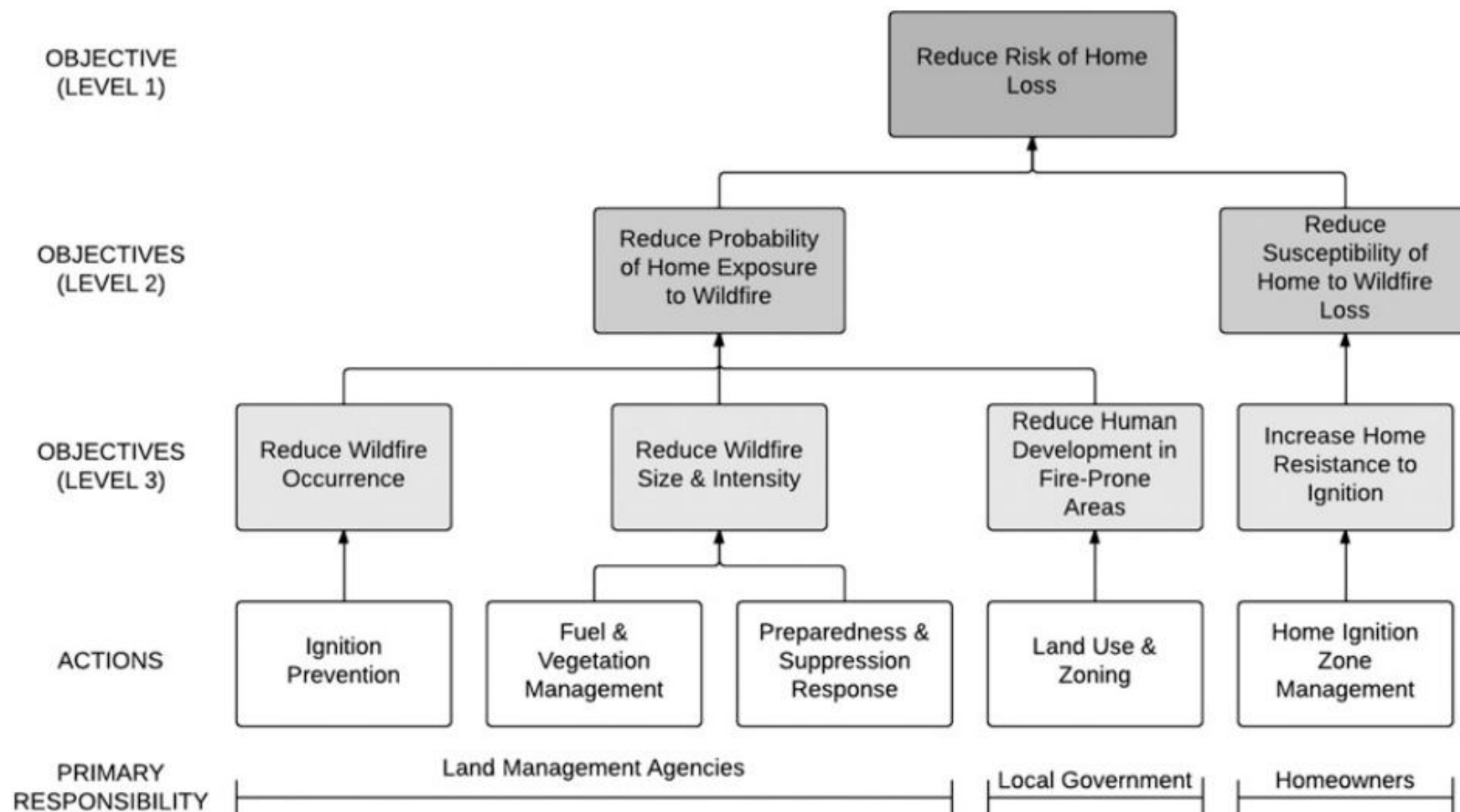
Certain plant species only release their seeds into the environment when the temperature is very high, often due to a fire.

Burning plant matter returns nutrients into the ground, where it can be used to help new plants grow and develop.

Many species survive and thrive in the environment created by fires. While some see destruction, others see a new ecosystem.

When humans try to prevent wildfires, they allow the forest to continue building up dead matter and create an ecosystem prone to more intense, dangerous fires in the future.

Wildfire Management Model



Wild Fire- Disaster Management

- Fuel Load Mapping: Utilize satellite data to assess vegetation and potential fuel sources.
- Controlled Burns: Reduce excessive biomass in fire-prone areas.
- Utilize Biomass: Promote collection for briquettes, micro power plants, and crafts.
- Ground-Based Detection



Wild Fire- Disaster Management

- Awareness Campaigns: Target schools, farmers, and local communities via radio, TV, and social media.
 - Incentives: Reward communities for fire prevention efforts
 - Capacity Building: Equip community members with technology, protective gear and firefighting tools.
- Use satellite monitoring and sensors (NFPA 1143) & Drones.
- Implement controlled burns to manage vegetation

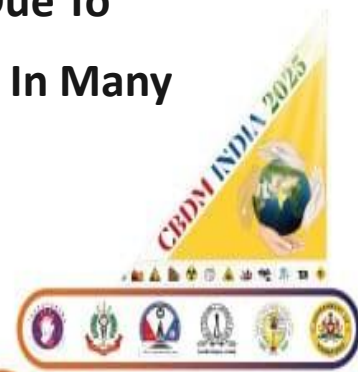


Comprehensive SOPs for Wild Fire

- Forest fire Prevention.
- Forest fire Mitigation.
- Forest fire Response.
- Recovery of Burnt Forest area.
- Best Practice of Different States.



**NASA Images Show Fire Due To
Extremely High Temperature In Many
Parts Of India**



SOP- FOR RESPONDING FOREST FIRE CATEGORIES

Large Forest Fire: LFF or Large Forest Fire is considered when the fire has spread across 0.5 or Half a Square Kilometer from the point of origine of forest fire in a given area.

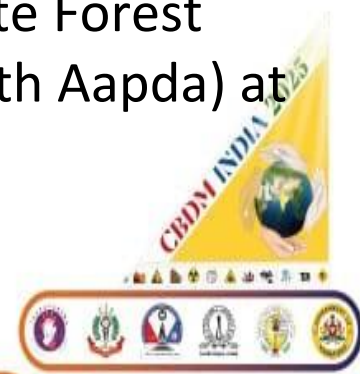
First Responder – Day 1, forest fire reporting, Forest Beat/Range (ground staff)- Surface fire, forest area burnt at minimum 1- 20 hectares.

(Green Alert)

In case the Forest Fire turns into Large Forest fire (LFF) 2-3 days, approx. 21- 42 Ha/ 0.5 Sq KM State fire service to be involved to tackle forest fire in this scenario. SDMA – to inform NDMA control room and submit report on hourly basis to NDMA.

(Yellow Alert).

Large Forest fire (LFF) 4-6 days, forest area burnt approx. 41- 80 ha, including protected areas, if the forest fire continues, DDMA to support the State Forest Department (SFDs), SDRF to be deployed along with (Apda Mitra, Youth Aapda) at this stage. **Yellow Alert).**



SOP- FOR RESPONDING FOREST FIRE CATEGORIES

Large Forest fire (LFF) beyond 6 days, forest area burnt approx. 80- 150 ha, (Red Alert)

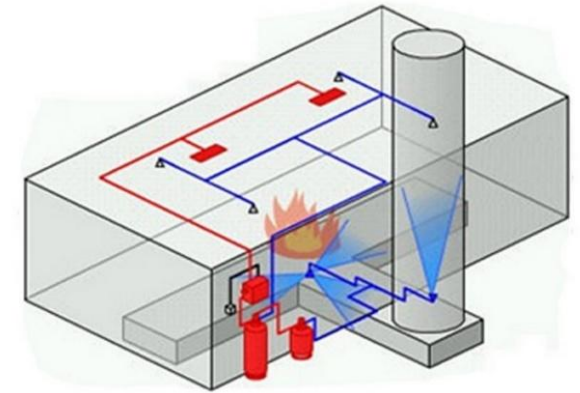
Large Forest fire (LFF) beyond >10 days, forest area burnt approx. 150- 200 ha & above if further forest fire continues, NDRF and Indian Air Force (IAF) to be deployed at this stage, requisition to be made by the Chief Secretary of the states, under recommendation by PCCF&HoFF,



Disaster Management In Urban/Industrial Fire

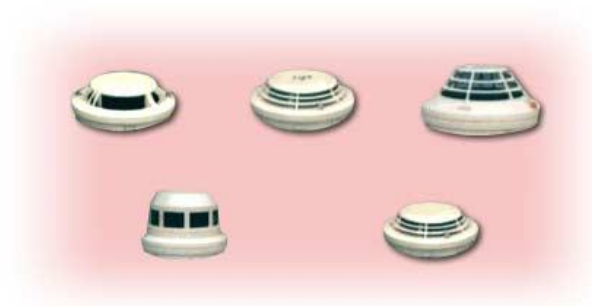
Fire Protection

- **Active Fire Protection System**
- **Passive Fire Protection System**



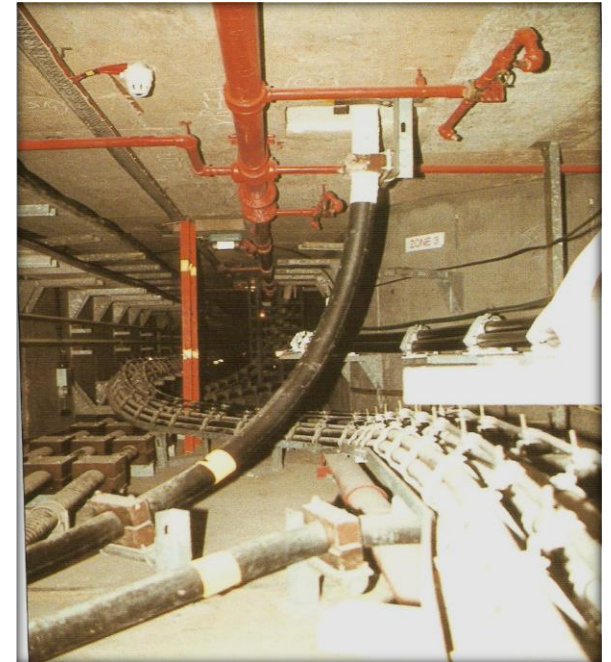
Fire Detection

- **Convictional Detection System**
- **Addressable Detection System System**
- **Hybrid Detection System**

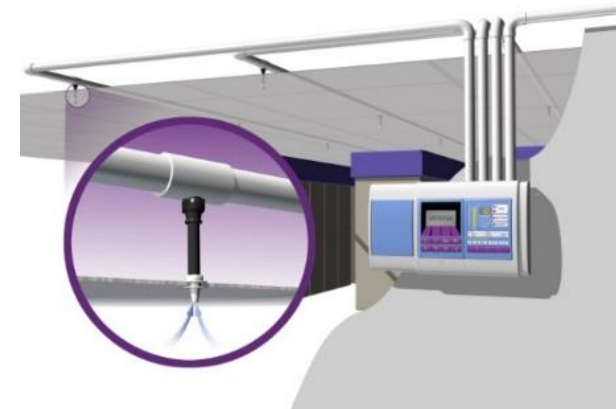


Fire Detection & Alarm System (FDA)

- Heat
- Rate of Rise /Fixed Temp
- Linear Heat Sensing (LHS)
- Smoke
- Flame
- Hazardous gases
- Aspirating Detectors (V.E.S.D.A)



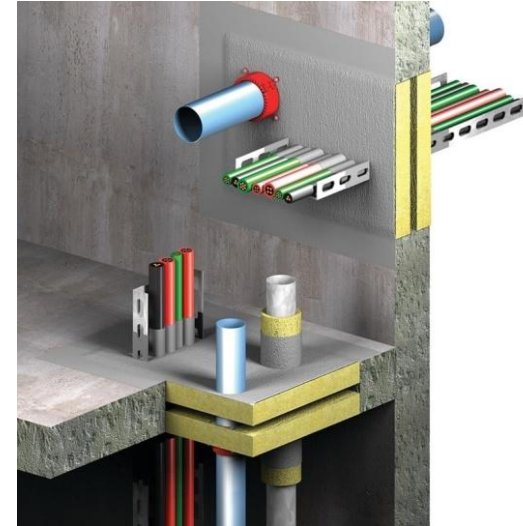
Fire Detection System



VESDA

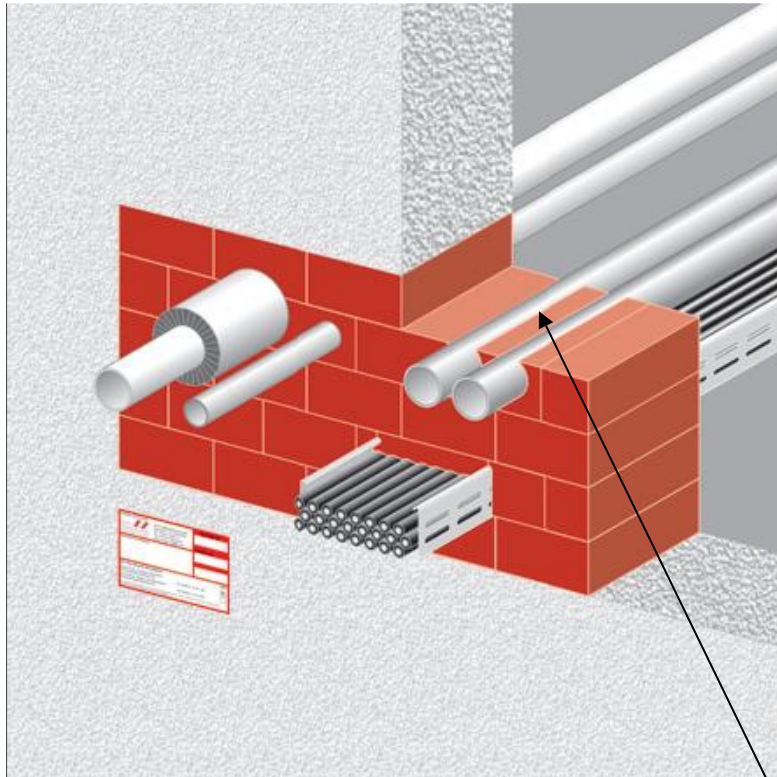
Passive Fire Protection

- Fire Resistance of Building component
- Fire Wall
- Fire Doors
- FRC
- Sealing Material
- Fire Barriers
- Dampers

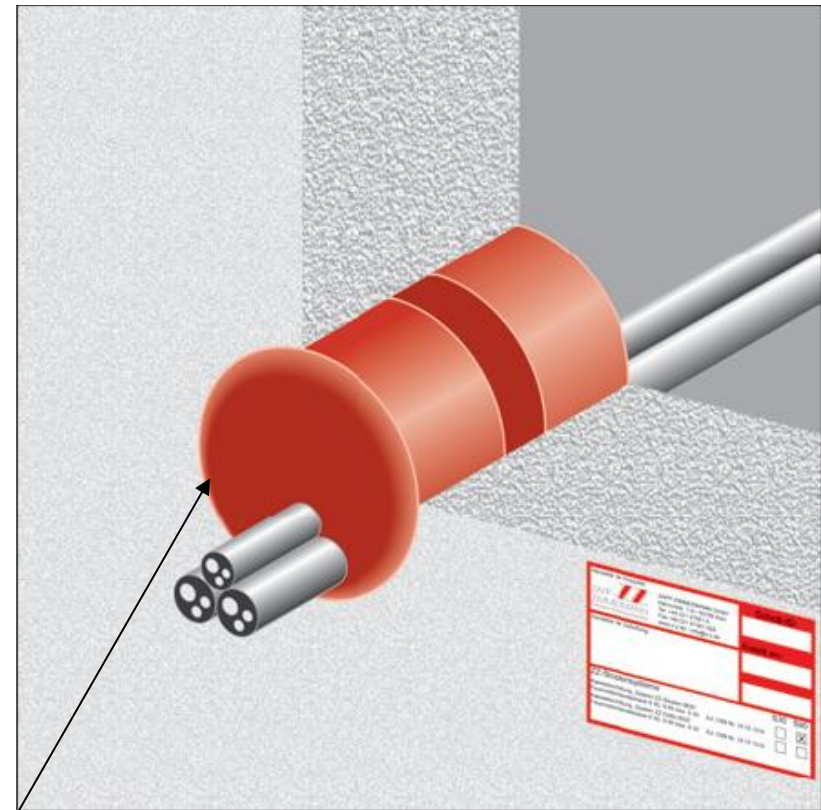


Passive Fire Protection

Fire Barrier



Cable and pipe penetration



Sealing Material

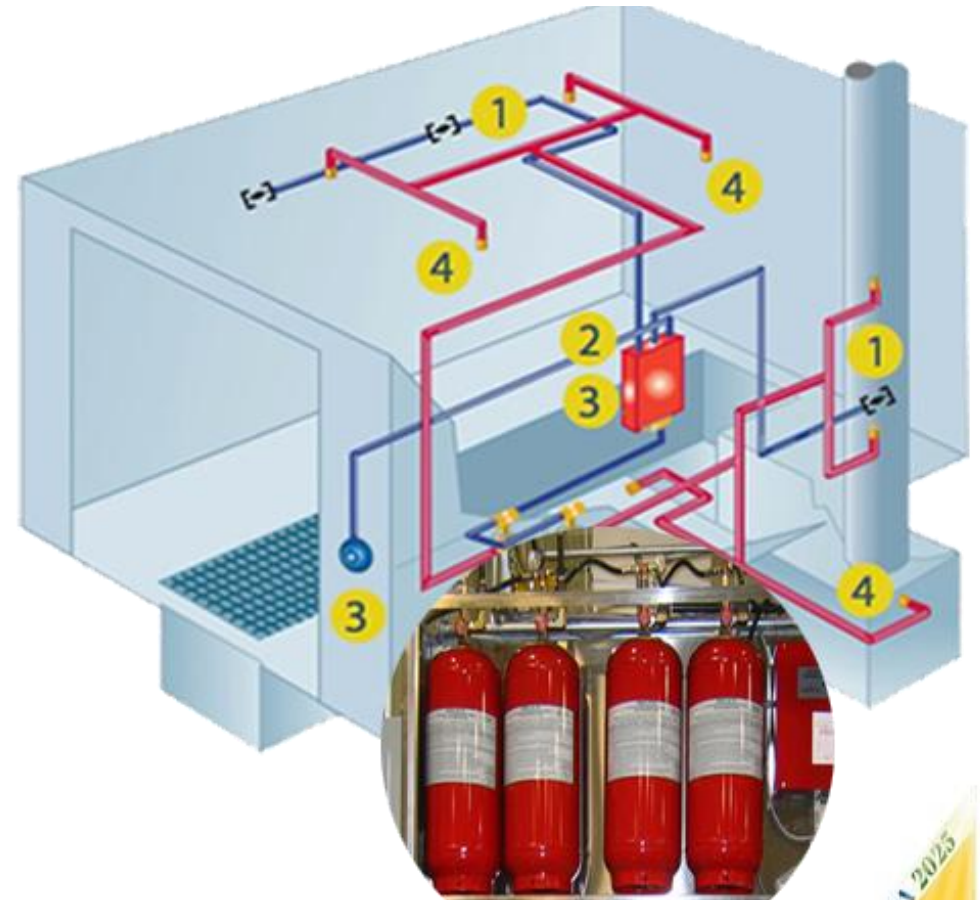
Active Fire Protection

- Fire Extinguishers
- Water Based System
- Foam Based System
- Gas based System
- Dry Chemical System
- Wet Chemical System

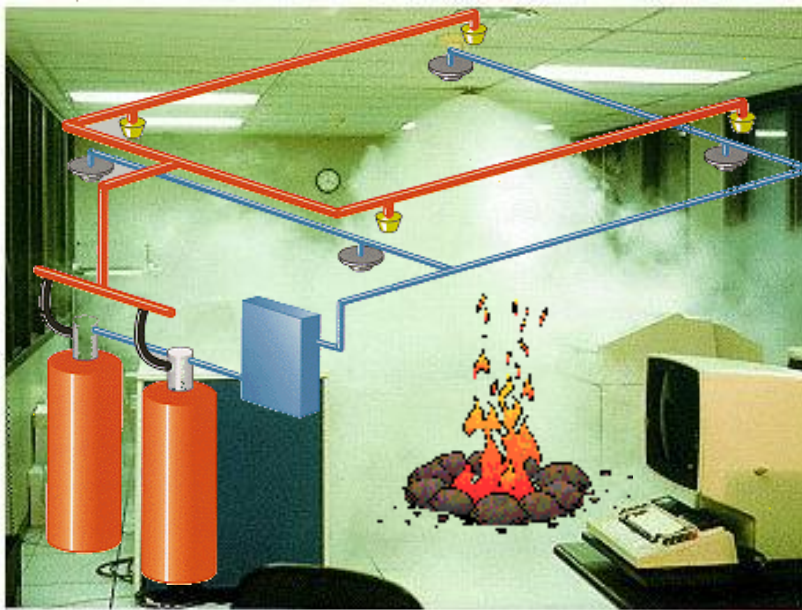


Clean Agent (CA) System

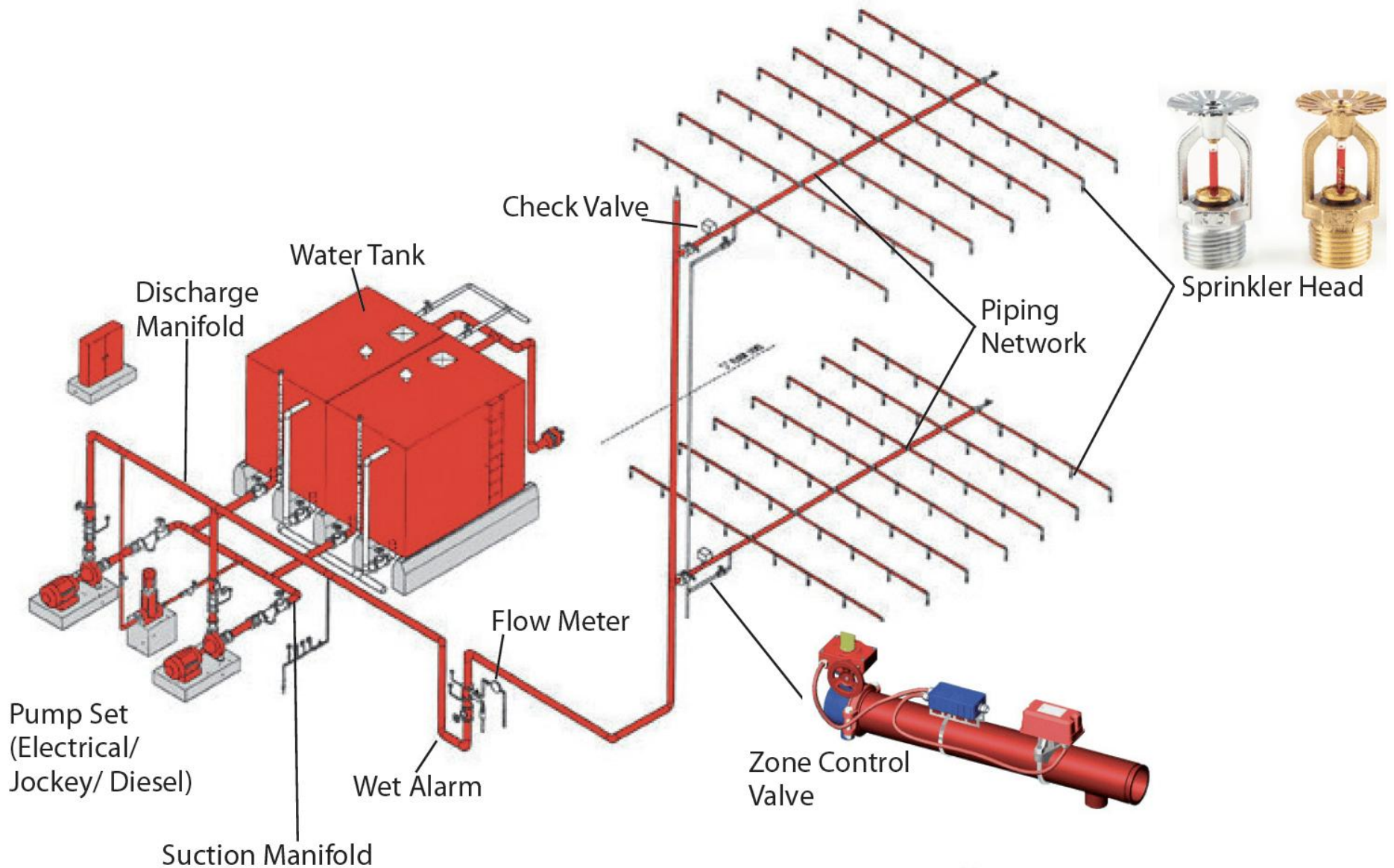
- Inert Gas
- Synthetic chemicals in liquid form



Gas Based Fire Fighting System



Automatic Sprinkler System



Industrial Fire-Conveyor Belt



Industrial Fire-Conveyor Belt



Water Spray System

A large industrial water treatment facility, likely a desalination plant. The image shows multiple stages of filtration or separation, with water being pumped through various tanks and pipes. Red pipes are prominent throughout the system. The facility is covered by a green corrugated metal roof. In the background, a body of water and some distant structures are visible.



Industrial/Urban Fire-Transformer



HVWS System for Transformer Fire Protection.

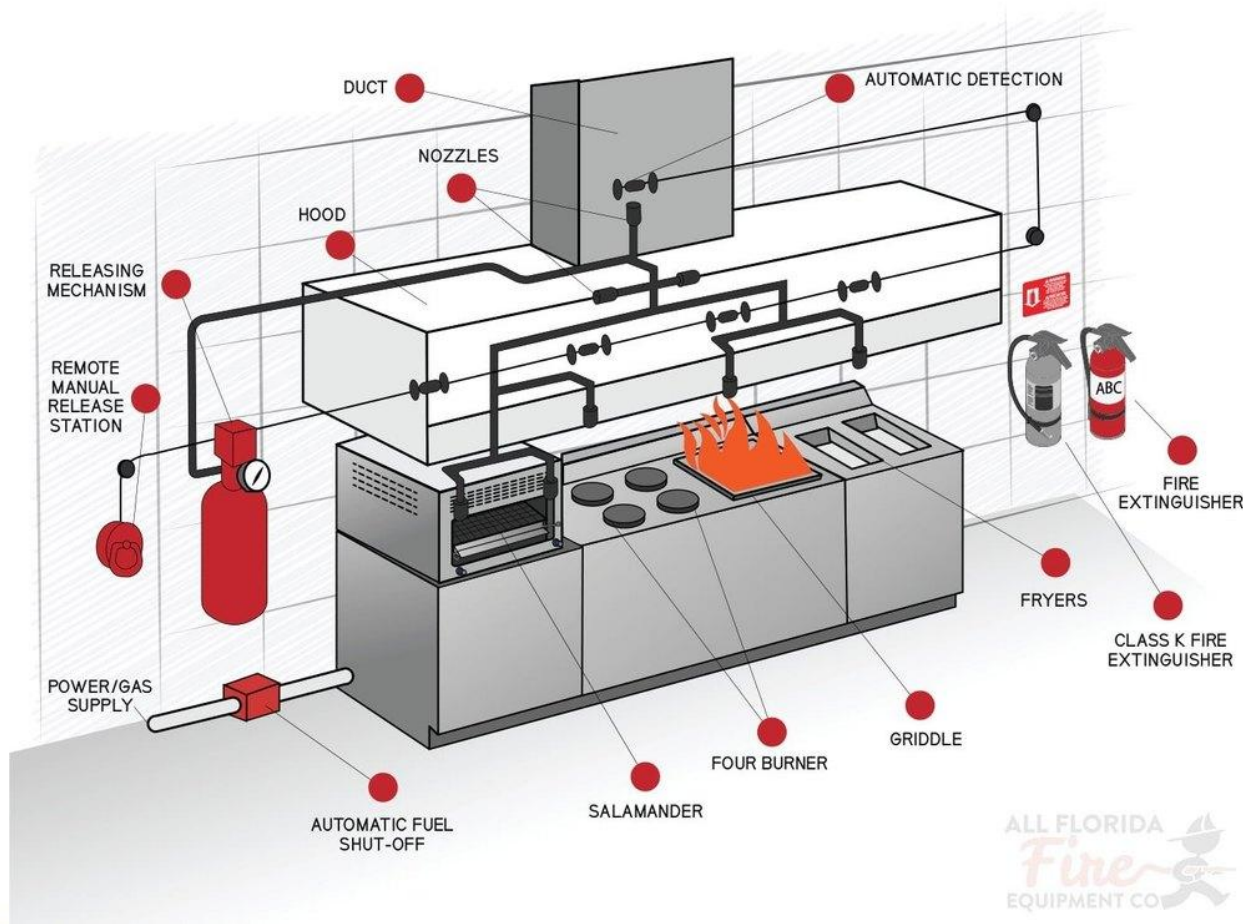


Wet Chemicals System for Urban Area

Potassium Acetate based wet chemicals:

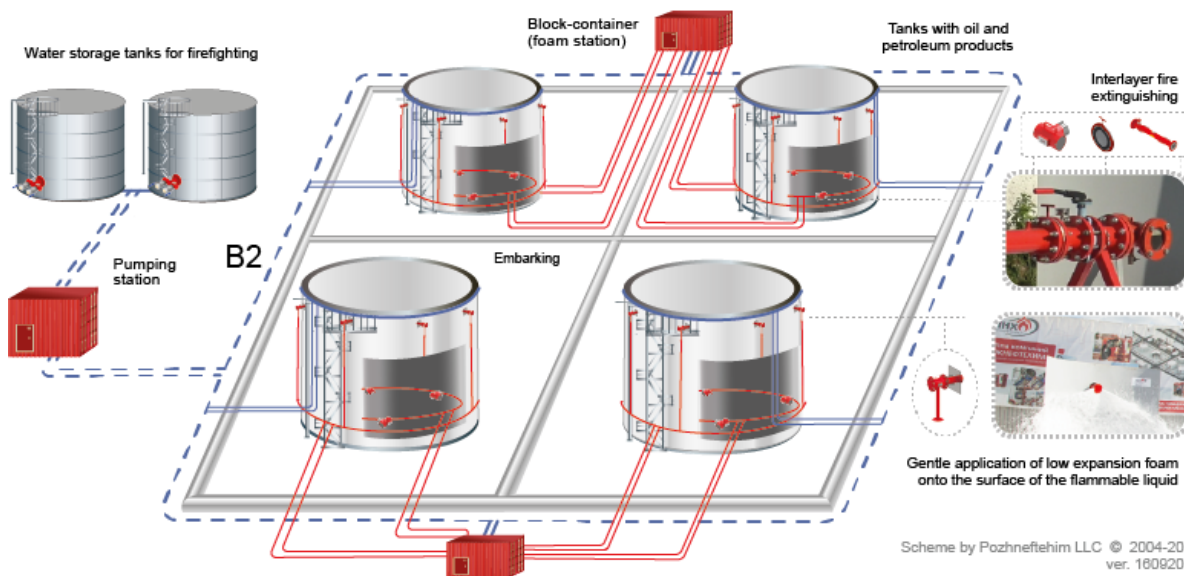
Composition: A potassium salt that is effective in breaking down fats.

Mechanism of Action: Saponification: Converts burning fats into a soap-like substance that suppresses the fire & Cooling Effect.



Design and installation of the low expansion foam system

- Fixed Foam System
- Semi-fixed Foam System
- Mobile Foam System
- Portable Foam System



Dike Area/Spill Protection (NFPA 11)



Water Mist Fire Suppression Systems

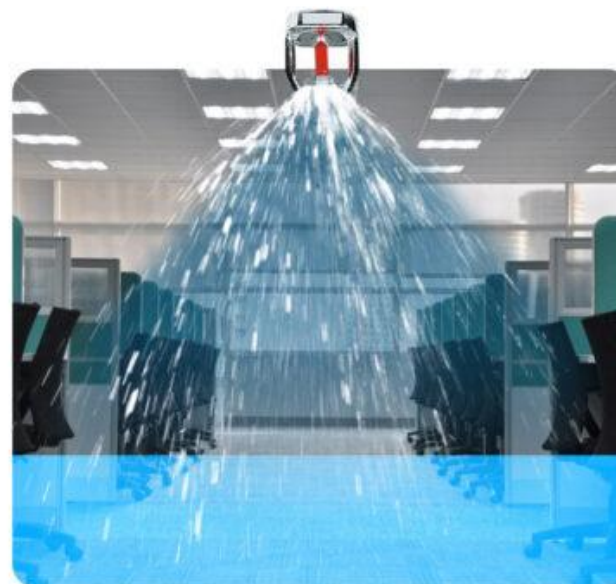
**WATER MIST
FIRE SUPPRESSION SYSTEM**

Uses up
to 90%
less water



**FIRE SPRINKLER
SYSTEM**

Higher water
consumption,
more water
damage



Operating Pressure

	Low Pressure System	Intermediate Pressure System	High Pressure System
Imperial Units	Under 175 psi	175 – 500 psi	Over 500 psi
Metric Units	Under 12.1 bar	12.1 – 34.5 bar	Over 34.5 bar

Ultra-High-Speed Water Spray Systems

Response Time.

Time for system operation from the presentation of an energy source to the detector to flow of water from the water spray nozzle being tested.

- **Not more than 100 milliseconds.**
- **Even faster for high hazard being protected.**
- **Water-filled piping.**



Conclusion

- Accidental fires require a multi-faceted prevention and management approach.
- Adhere to safety standards, leverage technologies, & foster participation.
- Lessons from past incidents inform better resilience strategies.
- Collaborative efforts essential for effective disaster prevention and management.



THANKS

