Sterling Fire Protection

Sprinkler system type quick guide

The system types side by side, with the hazard and storage classes that set a design.

CODE EDITION
NFPA 13-2019 (NBC(AE) 2023)

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The system types side by side

System	How it works	Where it's chosen	The catch
Wet pipe	Pipe stays full. Each head opens on its own heat.	Anywhere above freezing: offices, retail, apartments, heated warehouses.	It freezes, and a damaged head is a water leak.
Dry pipe	Pipe holds compressed air or nitrogen. An open head drops the pressure, the dry valve trips and water floods in.	Unheated buildings, loading docks, parking structures, freezers.	Water arrives late. Past 500 gal of pipe volume (750 with a quick-opening device), NFPA 13-2019 makes the design prove delivery time. Trapped water and corrosion are steady chores.
Preaction, single interlock	Closed heads on air-filled pipe plus a separate detection system. Detection opens the valve. A head opening alone lets no water in.	Data rooms, museums, electrical rooms, coolers.	Needs working detection, and supervised air above 20 sprinklers. Storage gets a bigger design area.
Preaction, double interlock	Needs detection and a head opening before water flows.	Freezers and spaces where accidental water is the bigger worry.	The slowest type, with design-area and delivery-time penalties. An AHJ can restrict it.
Deluge	Open nozzles. Separate detection releases water to all of them at once.	Hangars, transformers, other special hazards.	The whole zone floods, so drainage and water demand are big.
ESFR	Ceiling-only heads meant to suppress a storage fire.	High-piled storage.	High pressure, strict obstruction rules, and height limits that depend on the head's listing.

System	How it works	Where it's chosen	The catch
CMSA (large drop)	Large-drop heads that control a storage fire with a set number of heads at a set pressure.	Storage protected by control, not suppression.	Pressure-hungry, so the supply decides feasibility.
In-rack	Extra heads inside the racks, hydraulically balanced with the ceiling heads.	High rack storage where ceiling heads alone won't do it.	Racks move and forklifts hit pipe, so every layout change needs a sprinkler review.
13R and 13D	Smaller systems: 13R for low-rise residential, 13D for one- and two-family homes.	Apartments and houses within the standards' limits.	Not for larger occupancies.

Most buildings get wet pipe. If someone proposes double interlock, ask why single interlock won't do.

Hazard classification and what you store

- NFPA 13 sorts occupancies into light, ordinary and extra hazard, with ordinary and extra each split into groups 1 and 2, then picks a design density over a design area.
- Light hazard is designed around 0.10 gpm per square foot over the most remote 1,500 sq ft.
- Higher classes want more water over larger areas, which drives pipe size and cost.
- NFC(AE) 2023 sorts commodities into Class I to IV by how much combustible packaging and plastic they carry (Division B, Note A-3.2.1.1(1)(a)).
- Class I is essentially noncombustible product in ordinary cartons. Class IV carries an appreciable amount of Group A plastics such as polyethylene or polystyrene.
- In a sprinklered building, an individual storage area of Class I or II can run to 1,500 m^2 and 9.0 m high, while Group A plastics stop at 500 m^2 and 6.1 m (Table 3.2.3.2).
- A new tenant or new stock that raises the hazard beyond the design basis counts as a change of use, and the fire code requires an upgrade (Division B, 2.1.3.1(2)).
- The hydraulic design information sign at the riser states what the system was built to protect. NFPA 25 has it checked yearly.

Sources

1. National Building Code 2023 Alberta Edition, National Research Council Canada
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3. Hazard Class vs Design Criteria, MeyerFire University
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