

Understanding fire suppression products and standards

Having your fire suppression system tested and certified by a third party is critical to minimizing life and property risks in built environments



What are fire suppression systems?

Fire suppression systems extinguish, prevent and control fires from occurring or spreading. They involve a complex interplay of components, everything from the containers that store extinguishing agents to detection, discharge devices, actuation and distribution systems that make them work. Understanding the whole system is essential, including sprinkler pipes and fittings, sprinklers and nozzles, valves and fire main equipment. Systems include—internal sprinklers, valves and fire extinguisher units—and external components, such as hydrants and underground pipe fittings.

UL Solutions works to help our customers and their businesses meet safety and risk management goals for fire suppression systems

Fire suppression system components

Fire pumps

Fire pumps supply water to automatic sprinklers and standpipe systems such as hydrants. They are a mechanical device that moves water from low to high elevation while imparting velocity to the water to pressurize it. Fire pump requirements are detailed in building and municipal fire codes and must be strictly

followed to receive occupancy permits and insurance coverage. Centrifugal pumps are the most common types of pumps installed in buildings today. They provide pressure to water using centrifugal force created by an impeller.

Types of Centrifugal Pumps

Standard: UL 448: Centrifugal Stationary Pumps for Fire-Protection Service

	End Suction	In-line	Split Case	Vertical Turbine
Shaft Position	Horizontal	Vertical	Horizontal	Vertical
Stages	Single	Single	Single/Multi	Single/Multi
Flow Ranges	200-300 gpm	50-150 gpm	200-500 gpm	250-6,000 gpm
Driver Type	Motor/Engine	Motor	Motor/Engine	Motor





Fire extinguishers

Fire extinguishers are designed to protect a single, local fire hazard. They are easily recognized by home owners and building occupants, consisting of a pressure source and an extinguishing agent that is discharged by pressure through a nozzle often at the end of a hose that can be directed to the fire source.

Extinguishers are manually operated and typically portable, either carried by hand or wheeled to the fire

source. They are provided with a self-closure shutoff nozzle or control valve. Fire extinguishers are usually intended to protect a specific class or type of fire indicated on its label.

Building fire escape plan diagrams often indicate the locations of fire extinguishers so people can locate them quickly in an emergency.





Types of extinguishers

- Dry-chemical extinguishers
- Water extinguisher
- Carbon dioxide extinguisher
- Clean-agent extinguisher
- Foam-based-agent extinguisher
- Water-spray extinguisher
- Wet chemical extinguisher



Extinguishers are rated for different classes of fire, categorized by their ignition source and size:



Class A

Solid materials such as wood or paper, fabric, and some plastics.



Class B

Liquids or gas such as alcohol, ether, gasoline, or grease.



Class C

Electrical failure from appliances, electronic equipment, and wiring.



Class D

Metallic substances such as sodium, titanium, zirconium, or magnesium.



Class K

Grease or oil fires specifically from cooking.



Fire extinguishing systems

Fire extinguishing systems are composed of many components that work together to control fires. Carbon dioxide extinguishing systems, clean agent extinguishing systems, dry chemical extinguishing systems and self-contained automatic extinguisher units are a few common types

Devices within the systems discharge an extinguishing agent through a nozzle, hose, or fixed piping and nozzles. Systems are designed for automatic or manual operation and include components such as

- Expellant gas assemblies for storing, releasing and controlling the gas used for expelling the agent
- Tank assemblies for storing the agent
- Discharge control devices
- Other association equipment

Types of fire extinguishing systems include:

- **Self-contained**
Thermal actuation only, cannot be activated manually, used in an unoccupied space for a single protected area.
- **Pre-engineered**
Designed for a specific type of area listed in the manufacturer's documentation, used to deliver dry chemical, wet chemical, inert gas and halocarbon
- **Engineered**
Most commonly used in data centers to deliver carbon dioxide, inert gas and halocarbon
- **Total flooding**
Designed to deliver a specified agent concentrated through a hazard volume
- **Local application**
Deliver extinguishing agent to a specific area directly

Fire extinguishing systems must be tested to determine they are designed, installed and maintained in accordance with National Fire Protection Association (NFPA) standards.

List of fire extinguishing systems standards

Extinguishing agent	Standard	Installation standard
Inert gases	UL 2127	NFPA 2001
Halocarbon clean agent	UL 2166	NFPA 2001
Carbon dioxide	NFPA 12	NFPA 12
Dry chemical powder	UL 1254	NFPA 17
Wet chemical (kitchen)	UL 300 and UL 1254	NFPA 17A and NFPA 96
Aerosol	UL 2775	NFPA 2010

Pipes and fittings

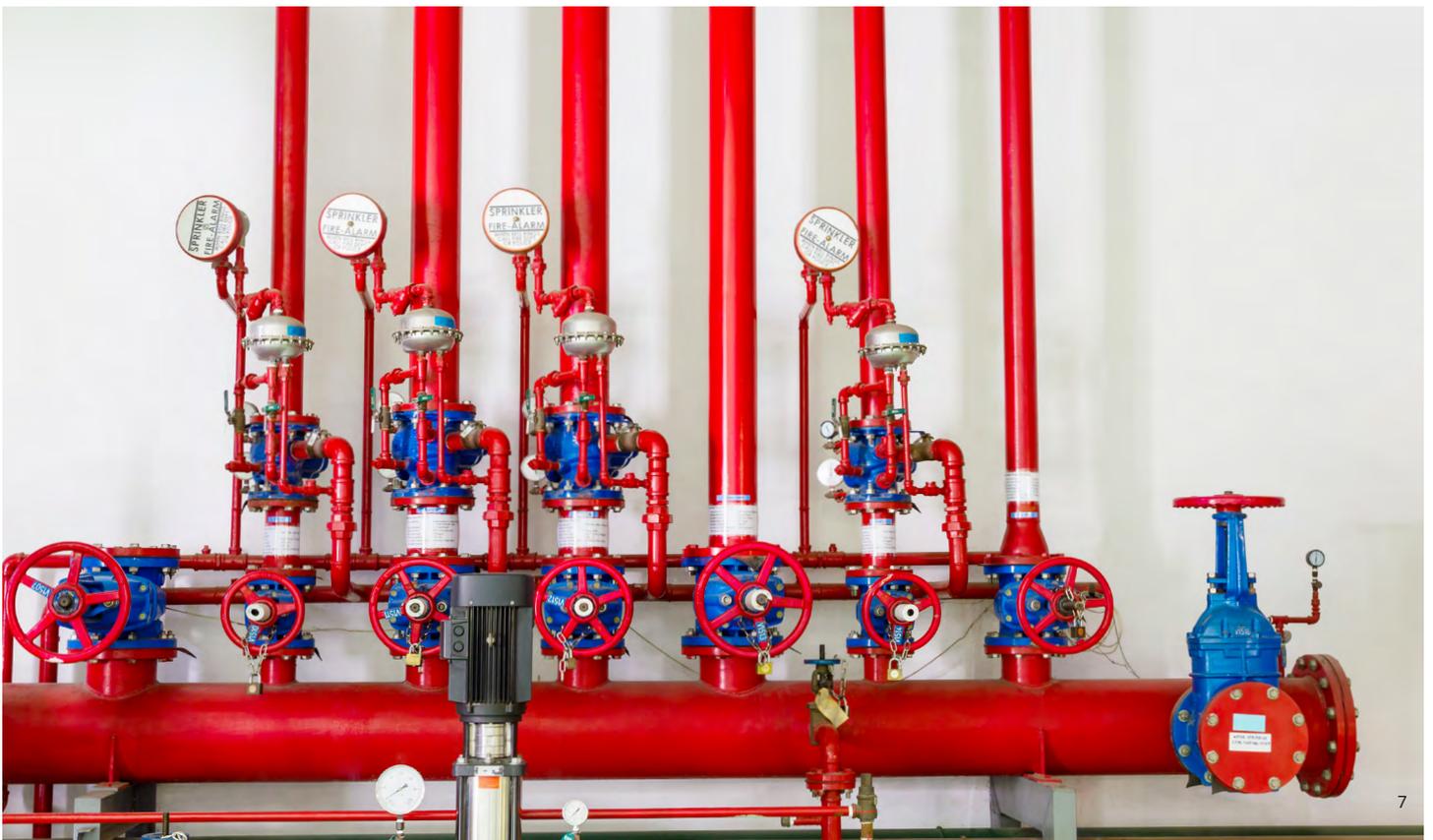
Pipes and fittings transfer water within fire suppression systems such as automatic sprinklers. They're a critical part of the infrastructure and must meet fire code standards and requirements to become certified.

Pipe hangers and sway braces attach the pipes and fittings to structures, supporting the pipe's weight and the water inside it.

- Metallic sprinkler pipes are generally black or galvanized, and flexible hoses with fittings connect the piping to the sprinklers. This flexibility allows versatility in sprinkler placement within ceilings and other locations.
- Thermoplastic sprinkler pipes and fittings are available in chlorinated polyvinyl chloride (CPVC) and are lightweight. Their plain, threaded or groove-end types are easy to install, don't require welding or joining, and need less maintenance.
- Rubber gasketed fittings, such as housings, gaskets and their hardware, can connect—steel pipe to steel pipe, steel pipe to sprinkler, steel pipe to fitting and fitting to fitting—including other various system components.

Pipes and fittings are covered by the following standards:

Component	Standard	Installation standard
Metallic sprinkler pipes	UL 852	NFPA 13, NFPA 13D, NFPA 13R
Flexible sprinkler hose with fittings	UL 2443	NFPA 13, NFPA 13D, NFPA 13R
Rubber gasketed fittings	UL 213	NFPA 13, NFPA 13D, NFPA 13R





Automatic sprinklers

Automatic sprinklers are intended to provide a reasonable degree of protection for life and property from fire. They're designed to control or suppress fire with water and can be found in different systems:

- **Wet**
System of pipes connected to a water supply
- **Dry**
System of pipes filled with pressurized air or nitrogen, rather than water to provide automatic protection in spaces where freezing is possible
- **Deluge**
used in places that are considered high hazard areas where high velocity suppression is necessary to prevent fire spread
- **Pre-action**
a dry sprinkler system that also has electrically operated valves that are activated by heat, smoke or flame

Sprinkler systems are used globally. They're not intended to totally extinguish a fire, but rather to provide adequate time for occupant escape until the fire department arrives. Performance requirements are tested for physical strength, leakage, operation, exposure, corrosion, water flow and distribution, as well as fire suppression.

The UL Standards for sprinkler systems include:

- **UL 199**
ANSI/CAN/UL/ULC Automatic Sprinklers for Fire-Protection Service
- **UL 199B**
Control Cabinets For Automatic Sprinkler Systems Used For Protection Of Commercial Cooking Equipment
- **UL 199D**
Guards for Sprinklers
- **UL 199E**
Outline of Investigation for Fire Testing of Sprinklers and Water Spray Nozzles for Protection of Deep Fat Fryers
- **UL 199G**
Outline of Investigation for Fire Testing of Specific Application Sprinklers for Use in Attic Spaces

Importance of third-party certification

Several fire safety stakeholders demand third-party certification of fire suppression systems, such as those that result in the widely accepted UL Mark.

Regulatory authorities, insurers, architects, contractors, code authorities, estimators, specifiers, building owners, developers and plan reviewers all require certified systems prior to approving the next step in the building development process.

Products certified by a trusted third party like UL Solutions have been evaluated for compliance and

can provide that evidence to code authorities. We require Follow-Up services for all UL Certified products, which verifies that products are produced in a manner representative of the certified construction and remain compliant with the requirements of the standard. This helps to meet evolving local building code requirements and match company policy. But most importantly, receiving trusted third-party certification will help minimize safety risks to life and property.



Evaluated for compliance



Manufactured under Follow-Up Services



Meet local building code requirements



Provide evidence of compliance for code officials



Match company policy



Minimize safety risk





Why UL Solutions?

UL Solutions is your global partner with fire suppression expertise. We can help you take on the challenges related to new-to-market products and systems throughout the world. We have international resources with local presence, and can help you achieve access to most markets quickly and effectively. According to an independent Interbrand study, 88% of all U.S. built environment authorities trust and accept the UL Mark and 94% of U.S. code authorities are familiar with our brand.

Our services related to fire safety include:

- **Pumps and Engines for Fire Protection Service**
We evaluate and test fire pumps and engines separately to determine their compliance with the applicable fire pump and engine standards for use in fire sprinkler systems.
- **Fire Sprinkler Pipe and Fittings Testing and Certification**
This testing and certification service specifically evaluates the critical components in a water-based fire sprinkler system, such as the pipe, fittings and pipe hanger equipment.
- **Fire Extinguisher Testing and Certification**
Fire safety professionals examine mechanical components such as cylinders, valves, gauges, handles, nozzles, siphon tubes, labels and extinguishing agents to certify their compliance with accredited standards.
- **Fire Extinguishing System Unit Testing**
We test a broad range of fire extinguishing systems such as carbon dioxide extinguishing system units, clean agent extinguishing system units, dry chemical extinguishing system units and self-contained automatic extinguisher units to safety and performance standards for extinguishing systems that are designed, installed and maintained in accordance with National Fire Protection Association (NFPA) standards.
- **Fire Sprinkler Testing and Certification**
Our suppression team supports manufacturers, regulatory authorities, building owners and insurance companies with certification and customized testing services for a variety of suppression equipment, including products for residential and commercial sprinkler systems.

To learn more about our fire suppression testing and certification services, contact your local representative or visit [UL.com/Solutions](https://www.ul.com/Solutions)



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