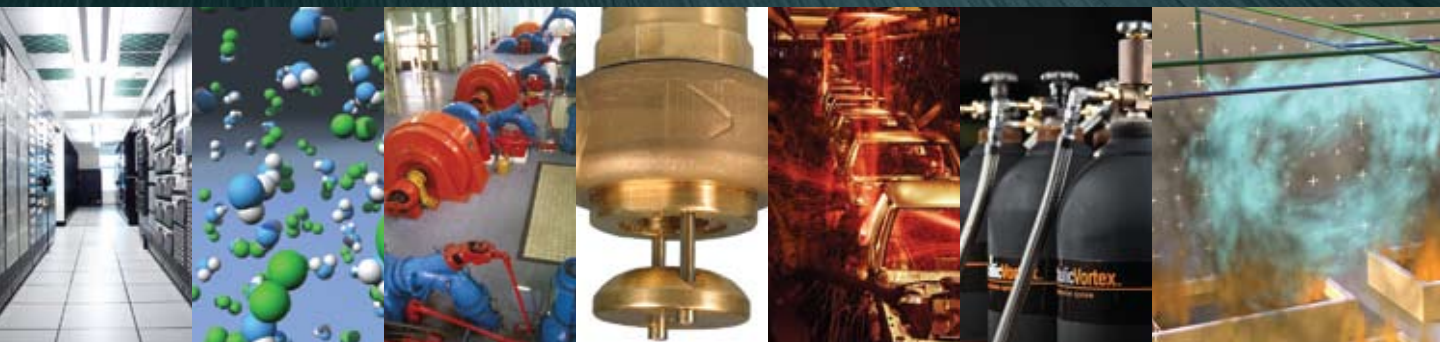


VictaulicVortex™

fire suppression system



THE ONLY HYBRID NITROGEN-WATER FIRE SUPPRESSION SYSTEM WITH:

- Nearly zero wetting of protected areas;
no need for costly clean up or equipment replacement
- Green design that is safe for the environment and personnel
- Quick system recharge; minimal facility downtime
- Open space effectiveness;
no need for assurance of room integrity



Piping. Systems. Solutions.

www.victaulicvortex.com

Introducing the world's first



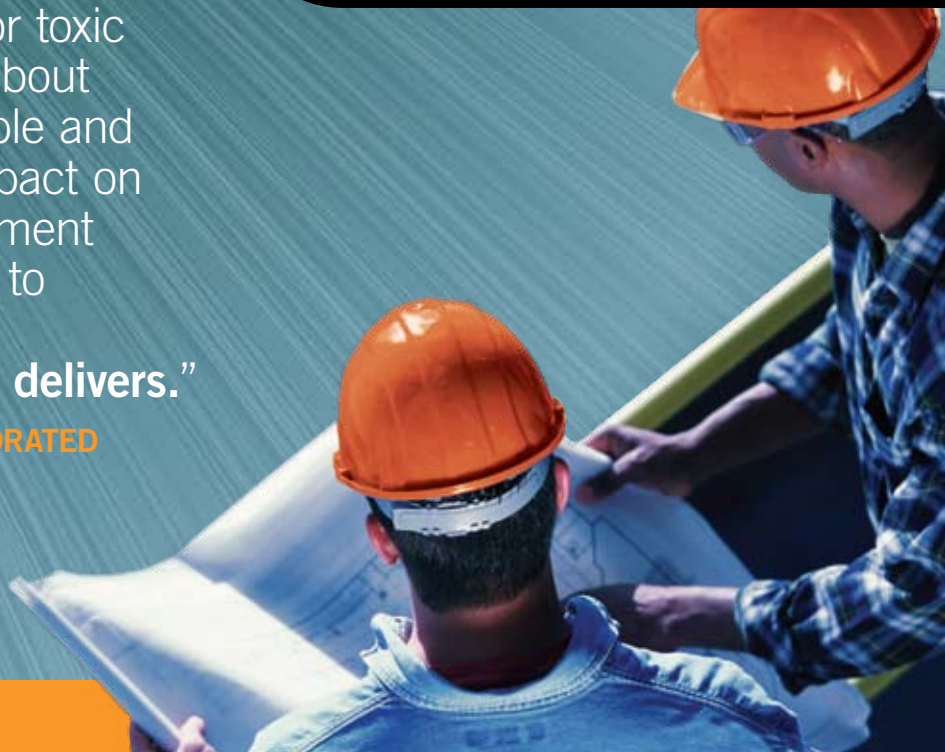
“My clients were very impressed with the Vortex system when they saw the level of fire protection it provides without huge amounts of water or toxic chemicals. It’s all about protecting the people and assets, minimal impact on the hazard environment and the fast return to normal operations.
The Vortex system delivers.”

TOM EUSON, 3S INCORPORATED

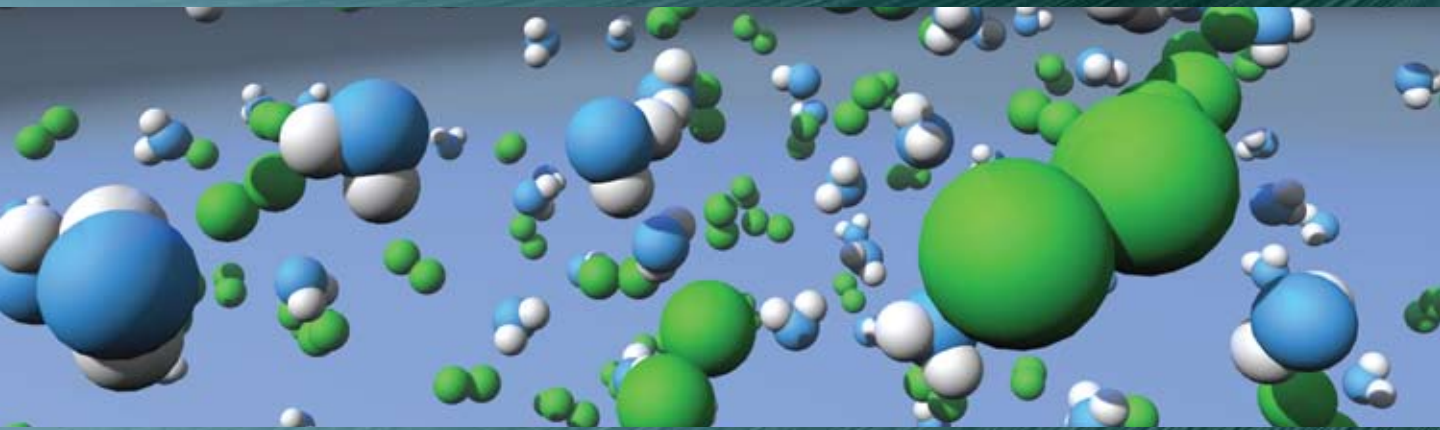
Until now,

“fire suppression” meant damaged equipment, lengthy and costly clean up, and lost productivity.

With Victaulic Vortex, experience a new standard of special hazard fire suppression, brought to you by Victaulic, the leader in innovation for the fire protection market.



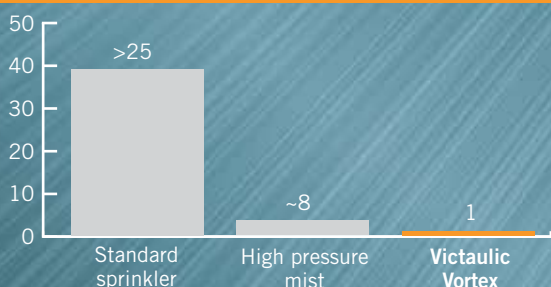
hybrid water/inert gas fire suppression system



The average Victaulic Vortex droplet size is less than 10 microns, and the minimal amount of water released per emitter—as little as one gallon per minute—virtually eliminates any wetting in a space.

Traditional sprinklers typically release more than 25 gallons of water per minute per sprinkler, or 96% more than the Victaulic Vortex system. In addition, high-pressure water mist systems release approximately 8 gallons of water per nozzle per minute, or 88% more than the Victaulic Vortex system.

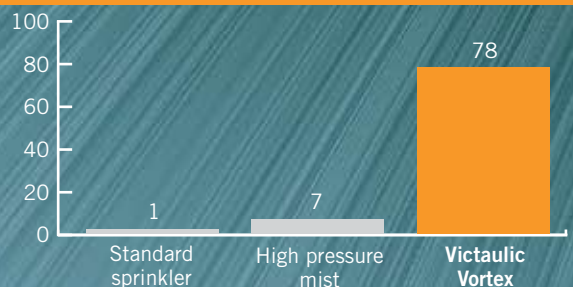
Relative amount of water required
GPM flow per emitter, nozzle or sprinkler



Unlike other combined agent systems, the Victaulic Vortex hybrid system utilizes both nitrogen and water as **complementary extinguishing agents**.

For smaller fires, the nitrogen is the primary extinguishing agent, reducing the oxygen level in the space to a breathable level, where combustion cannot be sustained.

Relative surface area of heat exposure
Square inches per minute, normalized Standard Sprinkler = 1



In larger fires, the water mist is more effective, cooling the fire by absorbing the heat and reducing the available oxygen. In fact, **the heat-absorbing water droplet surface area is 90 times greater than that of any standard sprinkler system**, providing maximum heat absorption efficiency.

VictaulicVortex™

THE VICTAULIC DIFFERENCE

The Victaulic Vortex fire suppression system is built on more than 80 years of Victaulic innovation and product development experience and provides the best capabilities of both water mist and inert gas systems.

Ease of design, minimal wetting and advanced fire suppression capabilities all give the Victaulic Vortex system the advantage over existing systems.

The homogeneous mixture of water droplets and nitrogen gas is propelled with enough energy to overcome the drag effect that has limited the effectiveness of traditional water mist systems.

40 mph



The unique swirling pattern quickly fills the hazard space and attacks the fire, overcoming aerodynamic forces that typically decelerate and diffuse water droplets making them ineffective.

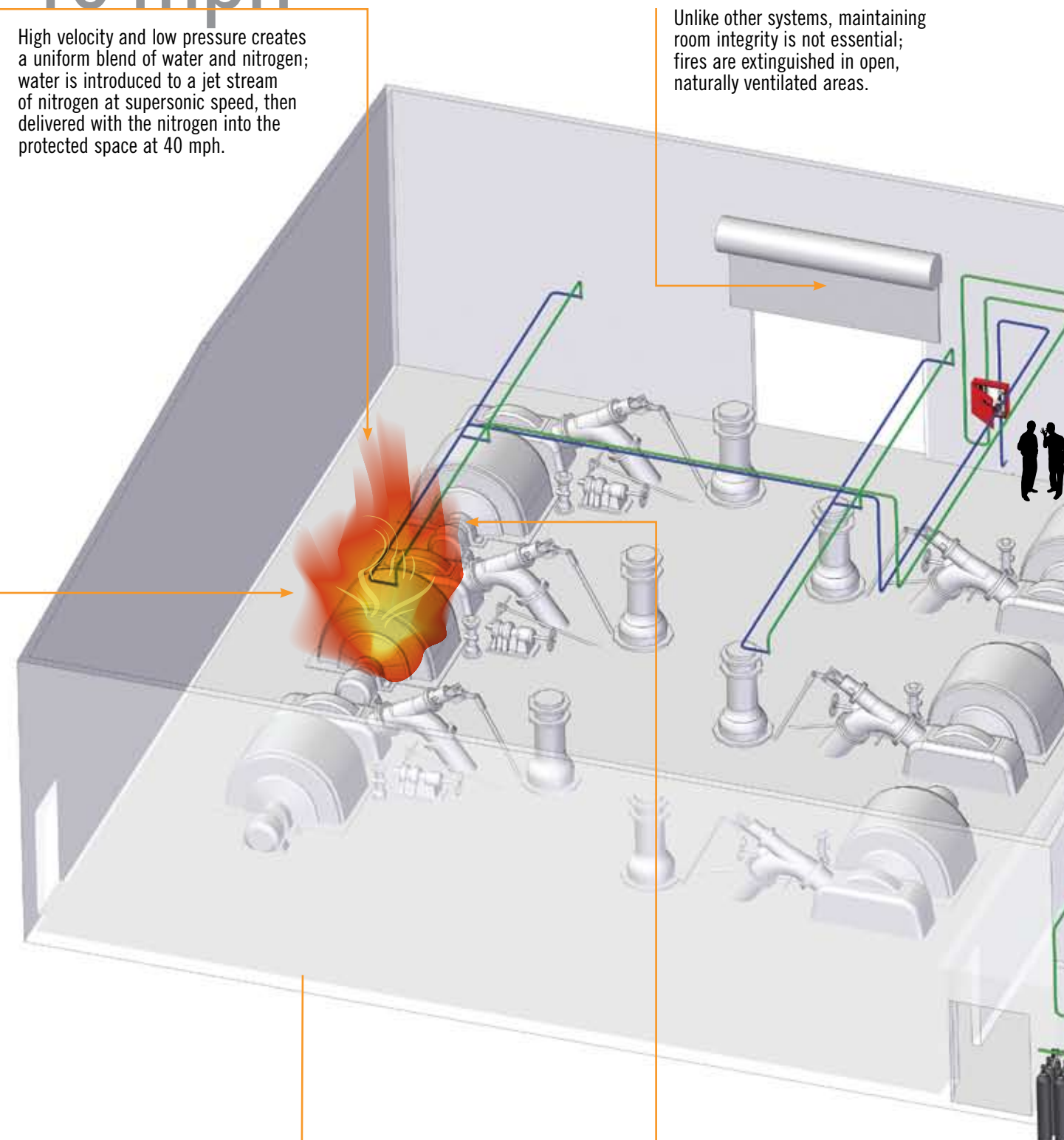
High velocity and low pressure creates a uniform blend of water and nitrogen; water is introduced to a jet stream of nitrogen at supersonic speed, then delivered with the nitrogen into the protected space at 40 mph.

Unlike other systems, maintaining room integrity is not essential; fires are extinguished in open, naturally ventilated areas.

10vs1000 microns

Water droplets are up to 100 times smaller than water particles delivered by a traditional water mist system, providing 50% improved heat absorption and total extinguishing.

Nearly zero water residue in protected areas means there is no water damage after the fire is extinguished.



124,000 cubic ft.

System is scalable from one zone of 124,000 ft³ to broad networks of zones as large and as many as required.

Zones can be centrally controlled yet independently activated for fire suppression only where required.



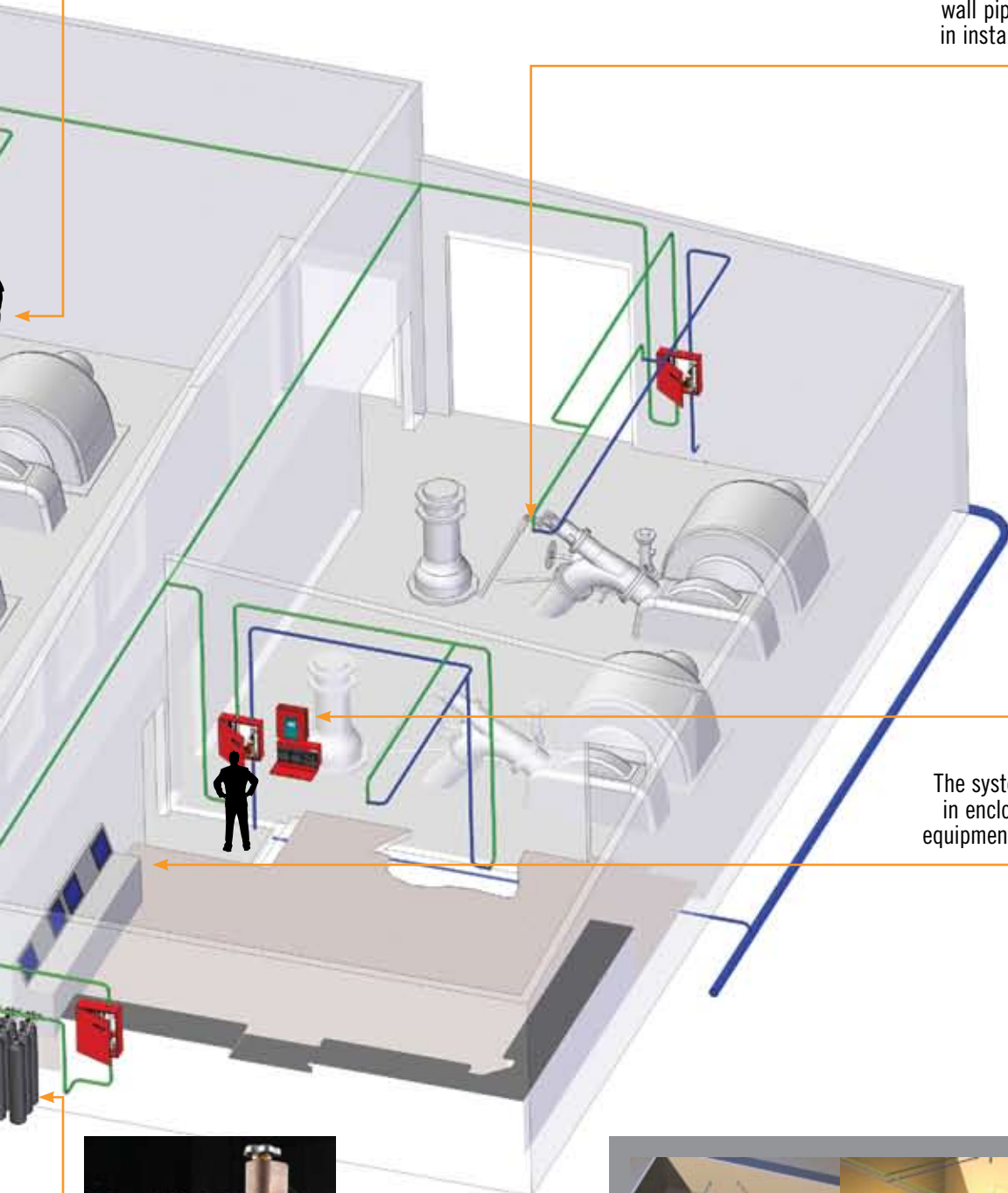


Made entirely of non-toxic agents — personnel are safe even during activation; reduction of oxygen in the space is at levels within safe breathing tolerances.

System activation is immediate when sensors detect smoke or heat — there is no delay in activation to evacuate personnel to avoid a toxic environment.

labor savings

Low system pressures — less than 25 psi of nitrogen and ~ 25 psi of water — permit lighter wall pipe providing direct savings in installation and material costs.



The system is compatible with facility fire protection systems providing greater design flexibility in both retrofit and new construction.



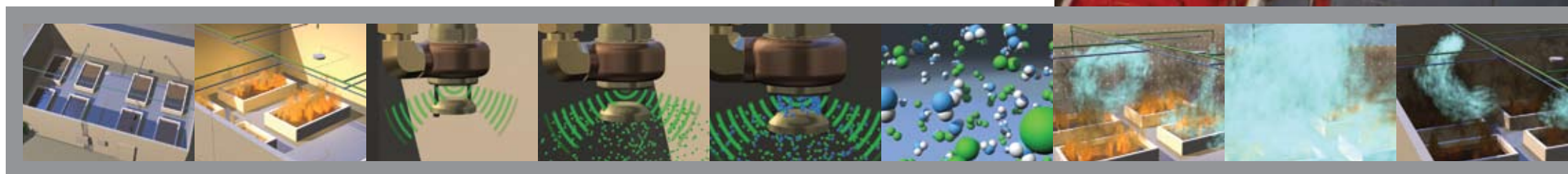
The system fully extinguishes fires in enclosed cabinets and isolated equipment within protected spaces.

2500 cubic ft.

The system delivers as little as one gallon of water per emitter per minute; each emitter can protect up to 2,500 cubic ft.



System is recharged rapidly allowing for a return to working conditions almost immediately after a fire.



The Victaulic Vortex emitter shape is based on supersonic aircraft wing design. The supersonic nitrogen flow drops rapidly to subsonic velocity, producing shock waves that atomize the water injected through the emitter.

The water and nitrogen mixture is projected at high velocity and great distance in a vortex pattern, absorbing the heat and starving the fire of oxygen.

Performance Analysis:

ENVIRONMENT IMPACT COMPARISON

Agent	
Victaulic Vortex Fire Suppression System	A hybrid system utilizing inert clean agent gas and water. The ~10 μ sized water droplets remove the heat in large fires and aid in the radiative and convective heat blocking. The nitrogen extinguishes small fires in large rooms in naturally ventilated environments.
Intermediate Pressure Water Mist and Sprinkler Systems	Larger size water droplets are used to soak the fuel source. Steam generated from the fire aids in the radiative and convective heat blocking. Large droplet size and momentum generally make these less efficient for shielded fires.
High Pressure Water Mist	Water extracts heat from the fire. Steam generated from the fire aids in the radiative and convective heat blocking. Momentum is generally lost within a short distance of the nozzle. More efficient for large fire extinguishment.
Inert Clean Agent Gases	Rely primarily on oxygen reduction. Limited thermal cooling and no reduction of radiative or convective heat transfer. Fuel is not cooled and re-ignition from hot objects is possible.
Halogenated Agents	Rely on flame temperature reduction due to the thermal characteristics of the agent or disruption of the combustion process. No reduction in radiative or convective heat transfer and the fuel is generally not cooled leading to possible re-ignition.

WATER CHARACTERISTICS COMPARISON

Agent	FLOW, GPM PER EMITTER, NOZZLE OR SPRINKLER	DROP SIZE, μm	OPERATING PRESSURE, PSIG	VELOCITY
Victaulic Vortex Fire Suppression System	<= 1	<10	25	High
Intermediate Pressure Water Mist	37	400 – 1000	350	High
High Pressure Water Mist	~ 8*	50 – 100	1500 – 2500	Low
Sprinkler Systems	>25	>1000	>20	Moderate
Inert Gases	N/A	N/A	2500	N/A
Halogenated Agents	N/A	N/A	360	N/A

*Dependent upon system design

AGENCY TESTING AND EVALUATIONS

The Victaulic Vortex system has **successfully completed all testing required by Factory Mutual** for:

- Special hazard machinery spaces
- Turbine enclosures
- IMO/Marine applications
- Flammable liquids

FM testing has proven the use of 2500ft³/70m³ per emitter for any room size.

The Victaulic Vortex system has been witnessed by Underwriter's Laboratory and **found to extinguish Class A polymeric and wood crib materials and Class B flammable liquid fires effectively in accordance with UL 2127.**

The EPA has provided a Significant New Alternatives Policy (SNAP) Approval for the Victaulic Vortex system, **listing the system as a hybrid inert gas, water-based system and an acceptable replacement for Halon 1301 in total flooding applications.**

The Victaulic Vortex system has **demonstrated the capability of extinguishing all fire scenarios of NFPA 750 and NFPA 2001** without needing to meet the extended discharge, room integrity (10 minute hold time) and delivery time (1 minute) requirements of NFPA 750 and NFPA 2001.

By only using the natural materials of water and nitrogen, the Victaulic Vortex system:

- is **not subject to specific government regulations** such as certificates of approval due to Ozone Depletion Potential (ODP).
- **does not require special processes for the replacement of proprietary agents** since the materials required for system recharging are readily available.



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