



Photos provided by Swiss Fire Protection

Full-scale testing reveals the PiFoam pattern of evenly closing in from all sides with the last fire dying at the tank's center.

Self-contained fixed foam system smothers tank fires with precision

CHOKER HOLD

Any diagram of the typical fixed fire protection system soon turns elaborate with pumps, proportioners and valves. By comparison, the Swiss Fire Protection Research & Development AG (SFPRD) Pi Foam Firefighting System for large volume flammable liquid storage tanks thrives on simplicity.

The system is basic and effective, said Andras Peller, SFPRD's director. He compared it to popping the top on an extremely agitated can of carbonated beverage.

"Despite being less expensive than most traditional systems, Pi Foam offers a quality of performance that can exceed any standard," he said.

Essentially, the Pi (Pressurized Instant) Foam system consists of a single moving part — a remote controlled valve that caps a high pressure vessel. If the sensors on the tank detect flames, the valve pops open and ready-to-use foam is pushed through a pipe network traveling up the tank and around the rim.

Within moments, a symmetrical coat of foam streams evenly down the interior wall of the tank and spreads across the burning product, meeting at the center to smother the fire.

"It's like closing the iris on a camera lens," Peller said. "Within a matter of minutes the fire is out."

Pi Foam is completely self-contained and requires no external power or water supply, he said. Foam density and performance is determined by the size of the pressure vessel and the diameter of the pipe network.

Chevron is already adapting Pi Foam to tanks more than 200 feet in diameter at its Kuwait facility, Peller said. The SFPRD customer list also includes the German oil terminal operator Oiltanking, a German crude oil and natural gas producer Wintershall Holding, the Austrian energy company OMV and the French pharmaceutical company Sanofi.

"We also protect the strategic kerosene reserves for the Hungarian army, and some tanks of the Hungarian Oiltanking terminal" Peller said. "They have asked us to create a plan to expand the protection to include all of the tanks, the dike areas and the technical areas as well."

The simplicity of Pi Foam is the key to its overwhelming success, he said. NFPA 11 requires a minimum discharge density of 4.1 liters per minute per square meter (0.1 gpm/square foot).

"We can easily beat that by as much as 80 or 90 l/min/square meter because we use a foam solution that is pressurized when



stored in advance and we use that pressure as the driving force,” Peller said.

Pi Foam uses no machinery or apparatus that would impede or degrade the foam solution performance and intensity, he said.

“Therefore we can raise the performance of the system to a very high standard capable of extinguishing any tank fire within three minutes,” Peller said.

Carbon dioxide and Ammonia are among the most soluble gases in water. By comparison, nitrogen, an inert gas used in many fire protection systems as propellant, is among the least soluble gases in water. The Pi Foam system is pressurized using a special mixture of gases for its benefit in expanding the foam solution.

That mixture is a proprietary secret that is adjusted to the climate it is used in, Peller said.

“We are dissolving gases into the water, despite agitating air or inert gas into the foam solution at the time of the crisis,” he said.

The gas mixture pressurizing the system might be top secret but the foam solution used can be off the shelf.

“The system can be used with standard commercial AFFF foams,” Peller said. “However, we have made a lot of tests to determine which commercial foam is best and which do not perform so good. We provide that list to our customers.”

However, SFPRD has developed its own brand of foam specifically designed for the Pi Foam system. The foam is biodegradable and non-toxic, Peller said. However, certification process has not been completed and the patent is pending.

“As far as the debate about foam, I would say that the old C8 and C6 formulations are much better performers as extinguishers, but they are very toxic,” he said. “The new fluorine-free foams are much better for environmental friendliness but their extinguishing performance is not the best.”

A circular foam injection ring inside the rim of the tank allows a continuous, curtain-like delivery of foam that gently slides down the interior wall.

“As it reaches the surface of the liquid, it starts to pile up along the outer edge until it begins flowing toward the middle of the tank,” Peller said.

The pressurized vessel is placed either above or below ground outside the protective dike surrounding the tank. Until the remote-controlled valve is opened, the pipe network remains empty. Rupture discs can be used to keep out the air and further reduce the chance of corrosion.

As simple as the Pi Foam systems sounds, it can be used with a sophisticated array of sensors that can differentiate between rim



fires and full surface fires, Peller said.

“When the rim seal fire detector is raising the alarm, we release just the amount of foam required to put out that type of fire,” he said. “If we released a full tank of foam on every fire we could easily sink the floating roof causing bigger problems that you started with.”

Beyond that, there is not too much that can go wrong with the Pi Foam system, he said.

“It’s a reliable system because the only moving part is the valve,” Peller said. “If you maintain the system well there is not too much that can go wrong. But we are working on an extremely reliable solution that does not have moving parts necessary to launch an extinguishment at all.”

“Simplicity is not necessarily a primitive thing,” Peller said. “We are quite confident about Pi Foam.”

If your fire training travel plans include a visit to Texas, IFW would like to know.

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