



REDUCE RISK: EQUIP YOUR SCHOOL BUS FLEET WITH FIRE SUPPRESSION TECHNOLOGY

Installing automatic fire suppression systems on school buses can bolster student safety while preventing huge losses in equipment. Here's an overview of how the technology works, and how to choose the right system for your fleet.





With a single school bus carrying up to 90 students and the driver, safety is paramount. The risk of fire poses a threat to the essential image of safety in pupil transportation, as recent incidents have shown.

Fires can move quickly through a school bus. Accordingly, students and drivers need as much time as they can get to evacuate. Although they undergo training on emergency evacuations, the time it takes drivers to get everyone off the bus can be increased by factors such as seat belts, rollovers, disorientation, and smoke.

Furthermore, school bus drivers have numerous responsibilities. While many have acted heroically to protect their passengers when faced with bus fires, ideally they should never have to face such a harrowing ordeal.

That's where fire suppression technology comes in. By equipping school bus fleets with systems that can automatically detect and suppress fires, pupil transportation officials can reduce risk and rest easier with the enhanced safety of their precious cargo.

School Bus Fires: So Much at Stake

Beyond placing students and drivers in danger, school bus fires present the potential for huge losses in equipment.

Taking into account the vehicle itself and additional equipment on board — video surveillance systems, for example — a full-size diesel school bus can cost well over \$100,000. Alternative-fuel models cost even more — especially electric buses.

School bus fires often occur at night when parked in the bus yard. With the vehicles spaced closely together, a fire can easily move from one bus to another, which can result in a loss of 10, 20, or even more buses. Replacing 10 school buses could cost well over \$1 million.

A school bus fire in the bus yard can also damage or destroy structures, such as garages and offices, plus the assets stored inside of them.

Meanwhile, losing a significant number of school buses could mean having to cancel transportation service. And that means many students will have to rely on less-safe modes of transportation — or they may not be able to get to school at all — during service interruptions.

Fires can also undermine public confidence in the safety of school buses. In pupil transportation, the trust of parents is critical. If they are not confident that the bus is safe, they will choose another way to get their kids to and from school.

Unfortunately, as federal research has shown, school bus fires are a daily occurrence across the nation.

The Frequency & Results of School Bus Fires

A recent federal report sheds light on the frequency and causes of school bus fires. Researchers at John A. Volpe National Transportation Systems analyzed data on school bus and motorcoach fire incidents from 2004 to 2013. The researchers' key findings include:

- **School bus fires in the U.S. occur slightly more than daily.**
- **Most school bus fires start in the engine area, running gear, or wheel area of the vehicle. For the incidents in which the area of origin was known, 68% of school bus fires originated in one of those areas.**
- **In “a significant number” of those fires, an electrical wire was cited as the first item to have been ignited.**
- **In the incidents that were analyzed, the most frequent cause of ignition was failure of equipment or heat source.**

The Volpe report noted that: “Notwithstanding the frequency of harmful events, the severity of these events — in particular, the extent of injuries and fatalities to drivers and passengers — are usually considered the most important measures of passenger transportation safety risk.” In fact, one such measure could be made when reviewing a tragic crash in Iowa.

On Dec. 12, 2017, a school bus driver picked up a student at a farm near Oakland, Iowa. The bus' rear wheels dropped into a 3-foot-deep ditch. As the driver tried to pull out of the ditch, a fire began in the engine compartment and spread throughout the bus. The bus became engulfed in flames, and the driver and the student were not able to escape. Both died in the fire.

The National Transportation Safety Board (NTSB) investigated the Iowa incident and issued recommendations to increase pupil transportation safety. Among them:

- **The U.S. Department of Transportation should require in-service school buses to be equipped with fire suppression systems that, at a minimum, address engine fires.**
- **The National Highway Traffic Safety Administration should require all new school buses to be equipped with fire suppression systems that at a minimum address engine fires.**
- **OEMs recommend that fire suppression solutions should be included on all new buses.**

NTSB concluded that the likely origin of the Iowa school bus fire was the exterior of the turbocharger in the engine compartment.

Other school bus fires in recent years have resulted in major damage and losses of equipment. Here are a few examples:

- **In August 2019, 12 school buses owned by a New York contractor were damaged in a late-night fire at the bus yard. Investigators determined that an electrical issue on one bus sparked the fire, which quickly spread to 11 other buses.**
- **In October 2016, a fire destroyed a bus terminal and about 34 school buses owned by a Wisconsin contractor. The total damage was estimated to be as much as \$3 million.**
- **In August 2016, a fire at a Washington school district's transportation facility damaged more than 28 new school buses.**

The high stakes of school bus fires, as well as the recent recommendations of NTSB, point to the need for a solution to reduce fire risk. Increasingly, transportation officials are turning to automatic fire suppression.



How Automatic Suppression Systems Put Out Fires

Fire suppression systems are typically installed in a vehicle's engine compartment. They also can be used to cover other areas of risk such as the battery box compartment.

Here's a quick overview of how they work: Pressurized tube systems activate by sensing heat. If the temperature reaches a defined point (e.g., 375 degrees Fahrenheit), a detection tube ruptures, opening a release valve and automatically starting the suppression.

To suppress a fire, these systems target the three key elements of the fire triangle: oxygen, heat, and fuel. For example, the Fogmaker system uses water mist to suppress fires by displacing oxygen

and reducing the ambient temperature to prevent re-ignition. It also blankets fuel sources with a biodegradable, nontoxic foam.

What to Look for in a Fire Suppression System

With a number of options available in the fire suppression market, how do you determine which system will be the best fit for your fleet? Here are five key factors to consider:

1. Will it operate in any orientation?

If a school bus rolls over and catches on fire in a crash, it's critical that the fire suppression system can still function. A high-pressure water mist system can deploy in any orientation, so it will function even if the bus is on its side or upside down.

Hotter Engines and Electric Buses Highlight Need for Fire Suppression

■ Developments in diesel engines and the advent of alternative fuels have reduced emissions from newer school buses, but they also bring the risk of high operating temperatures.

For example, the stricter diesel emission standards that have gone into effect in recent years have resulted in engines running hotter, which can increase the risk of fire.

Meanwhile, electric school buses are becoming more prevalent in pupil transportation. Electric buses generate significant heat from the batteries and connectors, again raising fire concerns.

These developments point to the need for fire suppression technology to keep high operating temperatures in check. For electric school buses in particular, a water-based fire suppression system is recommended for extinguishing battery fires.

2. Can it operate 24/7?

Because many school bus fires occur at night in the bus yard, fire suppression systems must be capable of operating at all times. The system should not rely on electricity — it should still function when the engine is off and the key is not in the ignition, thus providing 24-hour coverage and not requiring any battery backup.

3. Is it safe for human health and the environment?

Look for a suppression system that uses environmentally friendly agents and allow for easy clean up while not affecting those around the area of deployment. The Fogmaker system is 97% water, 3% AFFF (aqueous film forming foam) and is not hazardous to people or the environment.

4. Can it prevent reflashes?

Extinguishing flames immediately isn't enough. It's critical that fire suppression systems also prevent reflashes. Water mist systems cool the engine compartment below any reflash point hence breaking the one leg "heat" of the fire triangle thus preventing reflash. Along with this the AFFF coats the engine area with film to curb the potential for reflashes. Also, the system should run for an extended period of time — approximately 45 to 60 seconds — to further cool the engine compartment and reduce the risk of reflashes.

5. Is the technology proven?

Before buying a fire suppression system, ask for documentation showing that it has passed rigorous testing. A water-based system should meet UL 1384, which is UL's standard for water-based automatic extinguisher units. This process consists of more than 100 tests on detection, suppression, and components. Also, look for a P-Mark or ECE R107, which is the quality label of the RISE Research

Institutes of Sweden. This indicates that the system has been officially tested and meets legal, regulatory, and market demands.

Don't Wait for a Mandate — Get Proactive With Fire Prevention

In Congress, lawmakers have been considering the School Bus Safety Act, which would implement multiple NTSB recommendations, including a federal requirement for fire suppression systems on school buses.

Meanwhile, Nevada has already passed its own mandate for fire suppression on school buses, while Georgia and New Jersey require the technology on special-needs school buses.

Even in the absence of a mandate, many fleets have taken the proactive step of spec'ing fire suppression systems on their buses. Here are two prominent examples:

- **National Express LLC** announced in 2016 that it would begin adding Fogmaker fire suppression to its new school bus purchases. As the second-largest contractor in North America, National Express operates more than 22,000 school buses in the U.S. and Canada through Durham School Services and its other divisions. Company officials said they were impressed by a demonstration in which the Fogmaker system put out a fire in seconds. They also pointed to the environmental advantage of Fogmaker being a water-based system, and the fact that it uses pressure to operate, so it doesn't need to rely on electricity.

Seat Belts and Emergency Evacuations: Time Is of the Essence

■ While seat belts enhance occupant protection in the event of a crash, many pupil transportation officials have raised concerns that seat belts will increase the amount of time it takes to evacuate students from the school bus in an emergency

— particularly in the event of a fire.

That issue is a growing concern as more states require seat belts on their buses. In the fall of 2019, Iowa became the latest state to require all new school

buses to be equipped with lap-shoulder seat belts for passengers.

As seat belts are incorporated into school buses, pupil transportation officials should consider also adding fire suppression

systems to help increase survivability. Early detection and suppression of fires will provide more time for the driver and passengers to evacuate, which is especially critical when everyone is buckled in.

- **Mobile County (Ala.) Public Schools** announced in August 2019 that it will install Fogmaker's fire suppression technology in its fleet. The district committed to installing the systems in all 100 of its special-needs school buses within 60 days. Mobile County Public Schools also plans to eventually equip the rest of its fleet — 600 more school buses — with Fogmaker fire suppression.

The Cost Issue: Can You Afford Not to Protect Your Fleet From Fires?



With so much at stake in pupil transportation, reducing the risk of fire is a crucial component of fleet safety.

Consider the potential costs of fatalities, injuries, and equipment loss that could result from a school bus fire. As noted earlier, one bus alone can cost well over \$100,000.

Now consider this: At about \$2,500 to \$3,000 per bus, fire suppression systems are a smart investment to increase safety and peace of mind while reducing financial risk.

As federal data shows, school bus fires have become a daily occurrence across the nation, but they don't have to be. An automatic fire suppression system can guard against the threat of thermal events, 24 hours a day, seven days a week — whether your buses are in the yard or on the road transporting students. Your precious cargo deserves the added protection of fire suppression.

To learn more contact Fogmaker at 610-265-3610.

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Fogmaker North America is one of USSC Group's core brands. Fogmaker North America is a leader in water mist fire suppression systems for vehicles and enclosed hazards. This unique, environmentally friendly, pre-engineered fire suppression system is rapidly becoming a standard practice on mobile equipment like mass transit, school buses, heavy machinery, forestry equipment and much more. Fogmaker's patented high-pressure water mist system rapidly reduces heat from fires with a direct attack on the fire triangle - heat, oxygen and fuel. In seconds, engine fire temperature is reduced, allowing for rapid fire suppression and reducing the risk of re-flash. For additional information, about Fogmaker and The USSC Group, please visit www.uscgroup.com, or follow us on LinkedIn, Twitter, Facebook, You-Tube. Uscgroup.com/fogmaker-fire-suppression