

NEW AUTONOMOUS NON-PRESSURISED & LOW-MAINTENANCE FIRE SUPPRESSION SYSTEM IN VEHICLES

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Fires on trains, buses, automotive transport, military and mining vehicles are one of the most dangerous as they are unpredictable, rapidly developing, and may result in a large loss of human lives. Rapid detection of a fire and its instantaneous suppression is a mandatory requirement for any fire suppression system, however, the reliability of the system installed on trains, automotive transport, military and mining vehicles is challenged by extreme operation conditions, which include, but not limited to, elevated ambient temperatures in machinery compartment, high vibration and humidity, high speed, elevated levels of contamination and etc. The reliability of such fire suppression system is even more crucial considering the difficulties of accessing such fire sites by fire brigades and emergency services.



A special autonomous fire suppression system incorporating an IPEX impulse powder module and a T-start detection and actuation device has been developed by Pyrogen for automatic detection and suppression of fires in machinery compartments of various transport vehicles, in rail relays and cable tunnels and on mining and military vehicles.



Diesel compartment

Rail relay

Cable tunnel

1. IPEX impulse powder module

IPEX module is a non-pressurized self-contained canister delivering a dry chemical extinguishing medium into a fire zone **within 1 second** from the commencement of the discharge.

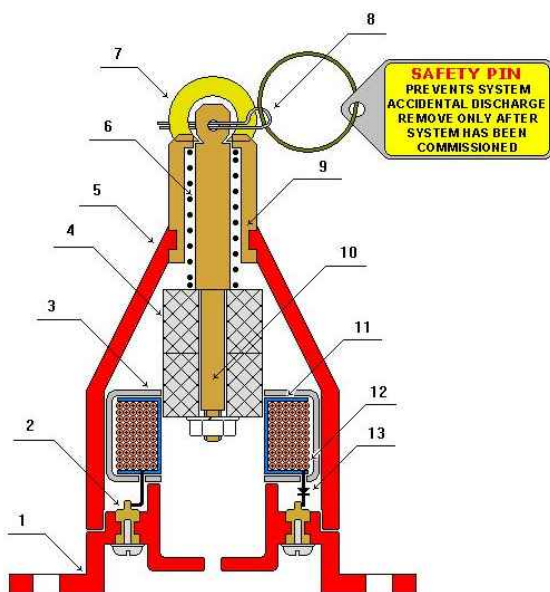
The impulse discharge is achieved due to a special cold gas generator incorporated into the canister containing the extinguishing powder. Upon activation of the system the gas generator operates releasing gases. The gases rapidly build up an internal pressure and aerate the extinguishing powder resulting in an impulse gas-powder delivery through a specially designed discharge outlet.

Implementation of the gas generator achieves two major results – provision of an astonishing rate of powder delivery and prevention of powder caking, thus resulting in extremely high performance of the system.

2. *T-start detection and activation device*

A unique T-start detection and activation device is designed to automatically detect the fire at either 72 °C or 110°C and generate an electromagnetic impulse to activate IPEX impulse powder modules.

The main element of the T-start is a heat-sensitive lock made of a special memory-shaped alloy.



In a fire situation when the ambient temperature near the heat-sensitive lock reaches its rated value of 72 °C or 110°C, the lock operates and releases a spring that moves a rod with an attached magnet through an induction electromagnetic coil generating an electric impulse. The generated electric impulse sets off the IPEX powder module(s).

Depending on the system requirements, T-start device can be a sole detection and activation device (simple stand alone Pyrogen-T-start fire suppression system) or form an integral component of a comprehensive complete fire system.



IPEX in Mining Komatsu vehicle



IPEX in bus engine compartment

The PYROGEN IPEX fire suppression system offers the following advantages:

- *Stand-alone system* – autonomous and fully independent from the external power sources and control systems;
- *High extinguishing efficiency* – rapid powder delivery, fast extinguishing action, low powder quantities;
- *Easy to install* – no pressure cylinders, no piping, light weight, located inside the protected area;
- *Cost effective* – high extinguishing efficiency at low powder amounts, simple installation, minimal maintenance;
- *Suitable for aggressive environments* – no powder caking, wide operation temperature range from -40°C up to 95°C; resistance to vibration and heavy contamination.

Pyrogen IPEX modular system is a drop-in low cost solution to a difficult task of protecting engine compartments and machinery spaces of automotive, rail, military and mining vehicles and other equipment from fires.

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