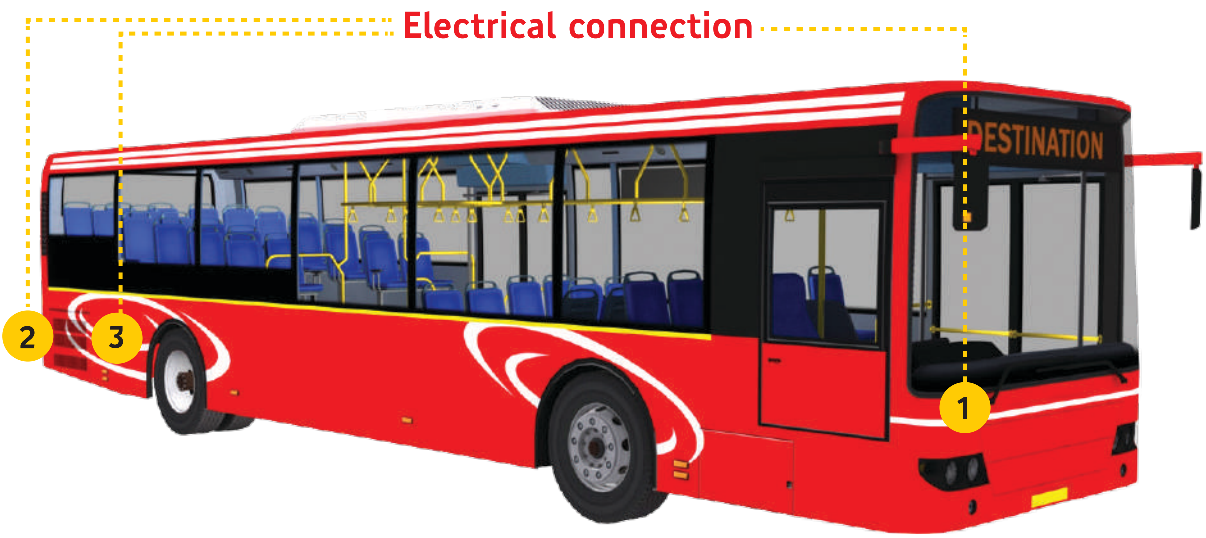
Fire Protection Systems For Buses

The operation of Buses poses several challenges when it comes to the safety of the passengers. Whether it is a commercial bus, school bus, or general transportation, if a fire occurs in a bus, it has the potential to be devastating. Preventive measures such as regular inspections and maintenance can reduce the risk of fire. Most bus fires start in the engine compartment and the surrounding areas. A tested vehicle fire suppression system in combination with a reliable fire detection system is the best first line of response in case of an emergency as it will quickly suppress the fire, minimizing damage and keeping passengers and the driver safe.

Fitech Vehicle's fire suppression systems are thoroughly tested for performance and environmental durabilities such as vibration, corrosion and extreme temperatures according to international vehicle standards to ensure the highest performance. The condensed Aerosol Fire Suppression system protects critical zones to ensure both passengers and equipment remain protected. The systems can be installed directly inside the engine compartment close to the high-risk area.



1

Control Panel

2

Generator 715 gm

3

Generator 90 gm

2 - 3

Thermo Sensitive Cable

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① Detecting fire in the Engine

Bus fire suppression systems work by detecting and suppressing the fire before it spreads. The Linear Heat Detector cable is a double conductor steel braided cable with a special heat-sensitive insulated sheath wrapped with a protective tape and overall surrounded with a high-performance fluoropolymer sheath.

When the temperature rises above 138°C the insulation of the conductor fuses inside the engine compartment. Because of the twisted condition of the steel wires, there is the mechanical force required to trigger immediate short circuit conditions. The Linear Heat Detection Cable melts and consequently shortens the circuit. This triggers the alarm panel at the driver's cabin.

② Discharging the Agent

The signal from the panel activates the aerosol canisters which are non pressurised metal containers equipped with a device to trigger the discharge of the compound immediately and it spreads the potassium salt aerosol inside the engine compartment.

③ Suppressing the Fire

The Potassium Salt Aerosols are an effective, economical and environmentally friendly extinguishing agent having the characteristic of extinguishing the fire generated inside the engine compartment effectively through a very fine dispersion by interrupting the combustion chain without reducing the oxygen present in the environment.

Salient Features of the System

- The system does not require pipes and nozzles which are exposed to mechanical fatigue from vibrations thus making it very easy to install.
- The Aerosol canisters are Compact and lightweight having a rugged design and do not require maintenance. They are made of steel and are automatically activated.
- The Aerosol produced is non toxic to passengers, environmentally friendly and does not damage mechanical equipment.
- It is designed to protect the engine compartments and does not cause damage to the vehicle furnishing. Can be integrated with the buses Interface Management System.
- The infinitesimal size of the particles does not generate dirt in the engine compartment in the event of discharge even if the engine is running.
- Protection against Class A (surface), B, and C fires.

The System meets the specification of AIS135 Fire Detection and Alarm System (FDAS) & Fire Detection and Suppression System (FDSS) for Buses and can be tailor made to meet the customer's requirements.

Vehicle Fire Suppression Systems to deal with all On Road Fire Scenario

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Fitech Automatic Clean Agent Tubing System

Fitech Automatic Clean Agent Tubing System is an innovative automatic fire suppression system designed to provide a fast and reliable solution to extinguish panel & cabinet fires and help protect electrical panels. With the modern dependency on systems required to be live, any interruptions in operations can involve huge financial costs and impact businesses severely. Therefore it is essential that special attention is paid to effective fire protection for these electrical installations ensuring you can achieve ideal protection for your equipment.

Fitech Automatic Clean Agent Tubing System provides ideal protection ensuring the fire will be extinguished in the first critical moments of occurrence and works fully independently. The system is connected to a monitoring panel which provides necessary indication upon operation of the system and can be connected with the existing BMS / SCADA panels to ensure proper monitoring of the systems.

The system uses clean and green UL Listed, globally recognized non-toxic fire extinguishing agent FITECH227 (FM200/HFC227ea), FITECH236 (FE36/HFC236fa) and FITECH1230 (Novec1230 / FK5-1-12) to provide quick and reliable suppression to combat the fire and suppress it before it can spread within the cabinets minimizing potential fire damage.

Our highly reliable tube is unaffected by dirt, dust and debris. The flexible nature of the detection tube allows for an unlimited number of fire detection points. The flexibility of the tube ensures it can be placed near high-risk areas providing very fast and effective detection.

• Fitech Direct System

The fire suppression system operates by detecting fire and applying the agent using a detection tube connected to the cylinder valve. The detection tube is placed in the protected enclosure and is under constant pressure. In case of fire the detection tube degrades by the effect of fire or high temperature.

The activation and distribution of the clean agent (HFC227ea, HFC236fa & FK-5-1-12) is secured by the detection tube. When the detection tube is disrupted, the agent is released through the created hole. The detection system is independent of any electrical supply and operates automatically.

Direct systems are available in both low pressure and high-pressure capacities depending on the appropriate extinguishant selected.

When the detection tubing is exposed to a flame or high ambient temperature, it ruptures with a burst at the hottest point. The extinguishing agent is then discharged from the connected cylinder through either the burst hole in case of a Direct System or through the Pipework in case of an Indirect System, at the fire and extinguishes it.

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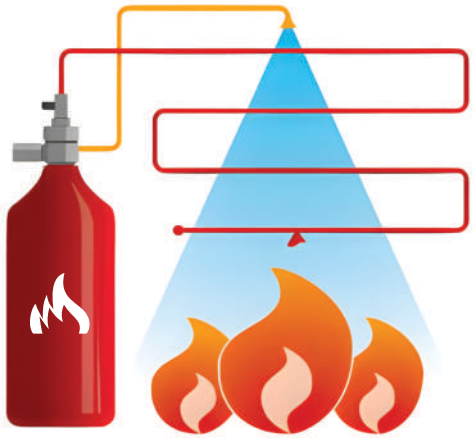
• Fitech Indirect System



This system is referred to as indirect, which means that it is activated by disruption of the detection tube and the agent is distributed via separate distribution tubes to the nozzles.

The fire suppression system operates by detecting heat with a detection tube connected to the valve of the cylinder. The tube is placed in the protected enclosure and is under constant pressure, thereby keeping the valve piston of the cylinder closed.

The indirect system is suitable for larger environments or where the specific application of the agent is required. This system also enables various modifications by adding optional components such as manual actuation, control panels for enhanced operation and control of the system.

Indirect systems are available in both low pressure and high-pressure capacities depending on the appropriate extinguishant selected.

Salient Features of the System

- Environmentally Friendly & Non Toxic.
- Fast and Automatic Operation from the initial Detection of Fire to suppressing it.
- Easy to Install & Maintain on both New and Existing Equipment.
- Cost Effective Solution and leaves no Residue.
- Compatible with Fire Detection, BMS & SCADA Systems.
- UL Listed Clean Agent and the Cylinders are as per BIS Standard.

Applications

- Electrical Panels & Enclosures
- Fume Cupboards & Fume Hoods
- CNC Machines
- Commercial Kitchen
- Public Transport
- Mining Equipment
- Server Rack
- Windmills Cabinet

Automatically Detects & Suppress the Fire at Source

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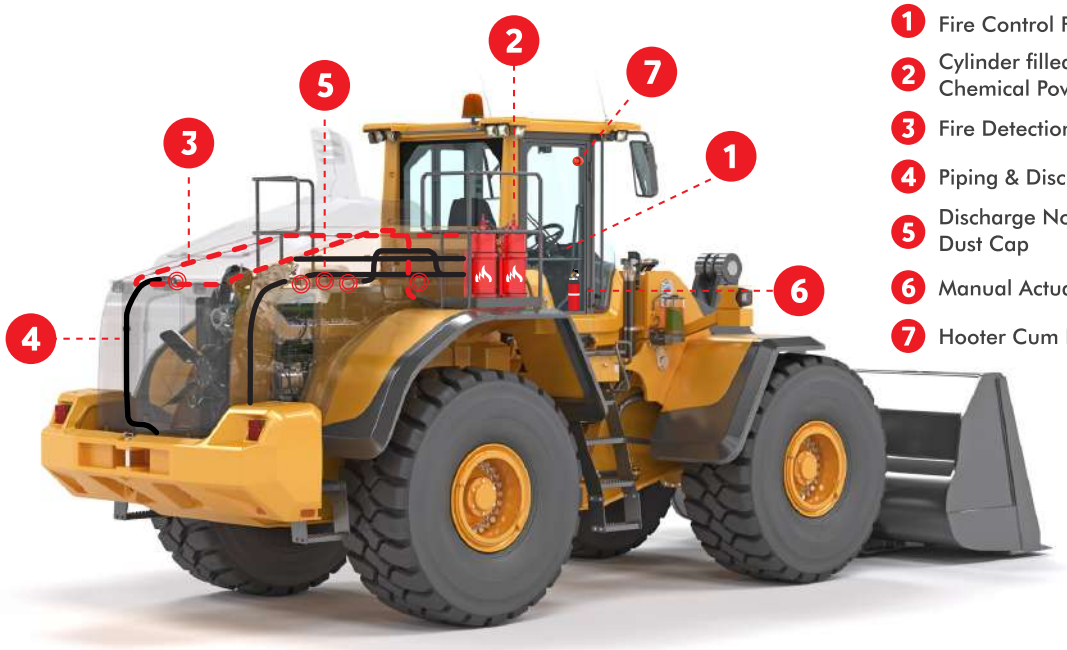
Fitech Automatic Fire Detection & Suppression System (FAFDSS) For Heavy Earth Moving Equipment

Fitech Automatic Fire Detection & Suppression System (FAFDSS) is designed to provide a fast and reliable solution to extinguish fires in Heavy Earth Moving Mining Equipment like Dumpers, Tippers, Dozers, Shovels, Excavators & Draglines etc. The system is designed to be used in dusty, humid and harsh mining conditions. These systems can also be designed as per the customer's requirement to protect both men & machine. This system handles all classes of fire: Class A (Wood, Paper, and Rags etc.), Class B (Flammable Liquids & Gases) and Class C (Energized Electrical Equipment) and is manufactured to fulfil all the requirements of DGMS Technical Circular No. 06 of 2020.

The Fitech Automatic Fire Detection & Suppression System (FAFDSS) is designed to protect all the critical areas of the vehicle and the same can be easily modified to ensure that its coverage area and capability can be increased as per the need and size of the vehicles. The system can be configured using cylinders of 10kg & 20kg individually or in multiples to ensure optimum coverage. Similarly, the number of nozzles can also be increased to cover a larger area. The system provides ideal protection ensuring the fire will be extinguished in the first critical moments of their occurance and works fully independently.

System Components



1. Fire Control Panel
2. Cylinder filled with Dry Chemical Powder
3. Fire Detection Network
4. Piping & Discharge Network
5. Discharge Nozzles with Dust Cap
6. Manual Actuation Device
7. Hooter Cum Flasher

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Automatic Operation Option

In the event of a fire, the temperature rises & the LHS cable detects the fire and gives a signal to the Fire Control Panel. The control panel starts giving a visual signal and an alarm to alert the driver and the personnel in the surrounding area. After a few seconds the electromechanical actuator is energized which punctures the rupture disc located on the expellant cartridge valve.

From the expellant cartridge, Co2 enters into the main cylinder which is filled with Dry Chemical Powder. The expellant gas mixes with the fire extinguishing agent and it flows through the distribution piping system to the nozzles and quenches the fire.

Manually Operation Option

In the event of fire, the Vehicle Driver can also activate the system manually by operating the electromechanical actuator through the activation switch in the control panel or by striking the knob provided on the electromechanical actuator or on the pilot cartridge assembly located in the driver's cabin, after this, it will work same as the Automatic Operation Option.

Once the system is activated and put into use, the Cylinder & Cartridge are required to be refilled to the maximum capacity & optimum pressure. Further, once the system is discharged the piping network and the discharge nozzles need to be thoroughly cleaned. This is essential to ensure the healthiness of the system for future use.

Salient Features of the System

- Early Fire Detection & Instant Fire Suppression
- Automatic Operation Ensures protection of Human Life & Reduces Downtime
- Easy to Install & Maintain. It can be refilled at site without special equipment
- Highly Dependable & Cost Effective Solution
- Suitable for Dusty & Humid Conditions
- In Compliance to DGMS Circular No. 06 of 2020

The System is available in capacity of 10kg, 15kg, 20kg, 30kg with varying number of Nozzles tailor made as per customer's requirement. It protects off-road equipment such as above-ground and sub-surface mining equipment, other off-road and specialty vehicles, and on-road vehicles.

Robust & Effective Systems to protect HEMM from fire in Harsh Environment

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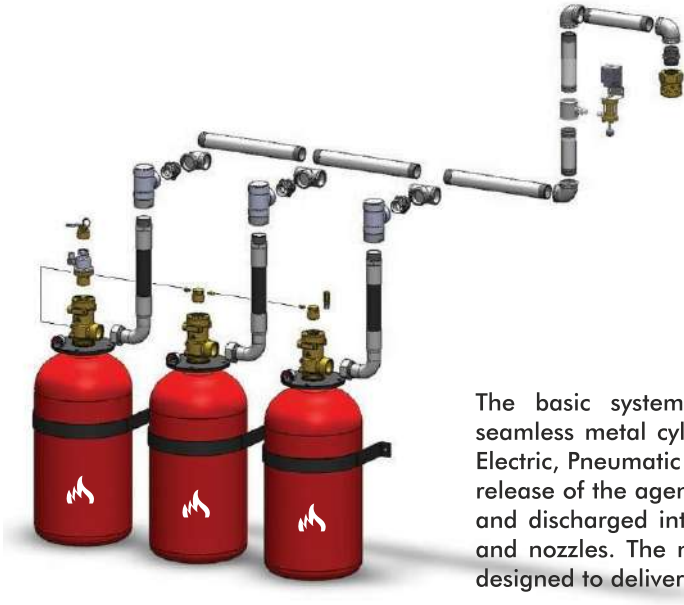
Clean Agent Fire Suppression

The Fitech Clean Agent System available in both 25 Bar & 42 Bar tend to immediately quench the fire protecting sensitive equipment without causing harm to people and damage to the environment. Fitech clean agent systems are majorly designed for applications where the areas are occupied, an electrically non-conductive suppressant is required and where clean up of the residue is a problem.

Our clean agent systems are available with FITECH227 (HFC227ea / FM200) and FITECH1230 (FK-5-1-12 / Novec1230) UL Listed agents that are dielectric, clean and safe for humans. Upon discharge, the clean agent removes or disrupts one of three elements needed to sustain a fire – heat, oxygen, or the fuel source. Most clean agent fire suppression systems reach extinguishing concentration levels in just 10 seconds or less, making them highly efficient in suppressing fire before significant damage can be done.

At design concentrations both the agents are safe for protecting closed areas and the discharge produces only a negligible decrease in the oxygen level. After discharge, the extinguishing agent can be dispersed by simple aeration because the clean agents quickly evaporate, there is minimal downtime as no clean-up is required. FITECH1230 agent compiles with NFPA Standard 2001 : Standard for Clean Agent fire Extinguishing systems, EPA SNAP Program (Significant New Alternate Policy).

Clean agent fire suppression systems are safe to use in occupied spaces, require no clean up after discharge, and are environmentally friendly with a short to no atmospheric lifetime and a low Global Warming Potential (GWP). These systems are designed around providing total flooding protection for small enclosed areas or large rooms containing sensitive documents or equipment.



Simple & Effective Operation

When a fire is detected by one or more of the automatic detectors or when a pull station is activated, the fire detection control panel sets off an alarm. After a brief time delay, the pressurized extinguishing agent cylinders are opened either electrically or pneumatically. The liquid extinguishing agent flows to the nozzles where it vaporizes, rapidly and effectively flooding the room.

The basic system consists of extinguishing agents stored in seamless metal cylinders. There are various types of actuators ie. Electric, Pneumatic and Manual for the actuation of the system and release of the agents into the hazard area. The agent is distributed and discharged into the hazard area through a network of pipes and nozzles. The nozzle is drilled with a fixed number of orifices designed to deliver a uniform discharge to the protected area.

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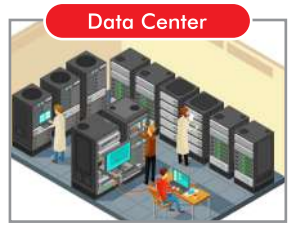
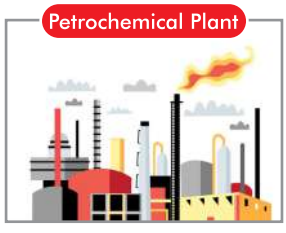
Applications





Discharge Time

The Fire extinguishing system is designed using a dedicated software for calculating the cross-section diameters of the nozzle passages to discharge the extinguishing gas into the environment in 10 seconds. Discharge time is defined as the time needed to reach 95% of minimum design concentration.

Full discharge within 10 seconds is clearly advantageous with respect to technologies that provide discharge times and consequently, extinguishment times in excess of one minute. Use of the HFC227/FK-5-1-12 extinguishing agents guarantee fast fire suppression and therefore less damage both to the protected spaces and objects and people present in the areas.

Certifications

The system cylinders conform to DOT, BIS & PESO standards. The components meet the requirements of UL & TPED 2010/35/UE, of the Construction Products Directive (CPD - 89/106/CE), and of the EN 12094-series standards. The clean agent FITECH227 (HFC227ea) and FITECH1230 (FK-5-1-12) are UL recognized.

Highly Effective and Safe For People, Environment & Sensitive Assets

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Fire protection for Armored Vehicles

The systems for Tactical Wheeled Armored Vehicle, Light Armored Vehicle and Main Battle Tank comprises of extremely fast and highly accurate sensors that detect fires and explosions in zones such as crew areas and engine compartments. The system is designed to suppress the explosion caused by unguided antitank attacks, mine explosions, inflammable and caustic hazardous materials, liquid fuel fires, RPGs antitank missiles or any other heavy armour piercing ammunition.

The extinguishers are equipped with high-speed valves to immediately flood affected compartments with efficient and approved extinguishing agents safeguarding crews and vehicles automatically. Optical sensors are located throughout the protected zone so that the entire space is monitored. Fire extinguishers are in supportive locations with distribution nozzles to ensure sufficient agent concentrations reach all parts of the protected space. An Agent Concentration Test (ACT) is typically conducted to validate concentration design. The control electronics panel is located within easy reach of the driver and/or commander.

The fire suppression systems is capable of suppressing the fire in less than 250 milliseconds. The system protects human life and precious properties against destructions which could be caused by armour piercing ammunition or hydrocarbon fuel in the vehicle.

Salient Features

- Inputs for up to 12 optical fire sensors and four linear thermal detectors
- Outputs for up to eight fire extinguishers
- Automatic and manual Double Shot discharge for each protected zone (Crew & Engine)
- Integrated manual discharge switches for each protected zone
- Inputs for external manual discharge inputs
- Continuous supervision of system components and maintenance mode override
- Qualified to vibration, shock and humidity requirements of MIL-STD-810 for combat vehicle conditions
- Qualified to various MIL-STD-461F, MIL-STD-1275A, MIL-STD-1275D, MIL-STD-1275E and ATPD-2404A & IP-67 Water & Dust ingress protection

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Main Controller Unit

The Main Controller Unit combines fire suppression system control and interface functions into a single unit. It serves the dual purpose of control electronics and control panels, thus reducing the component count and weight while simplifying the design of electrical wiring harnesses.

When a sensor detects a fire, the unit will activate the appropriate extinguisher within milliseconds. Alternately, a controller can perform this activation. The unit also provides fire warning outputs to inform the operator where a fire has occurred and an indication of extinguisher discharge status.

Fire Extinguishing Cylinders

Fitech fire extinguishing cylinders are high-pressure seamless cylinders that are specifically designed for various armoured vehicle Fire Suppression Systems. Each extinguishing cylinder is fitted with a quick-release cylinder valve having a large cross-section which ensures a very high rate of discharge via the piping and nozzles to extinguish any fire in both the engine and crew compartment.

The extinguisher contains Halons or environmentally friendly Halon Alternatives such as HFC227ea & HFC236fa which are instantaneously discharged and have no adverse effect on human beings when designed below certain levels of design concentrations.

Detection Sensors

The fire & explosion sensors respond to explosive fires within milliseconds having excellent false alarm immunity. The sensors use a dual spectrum infrared detection logic and can detect energy levels present in a fire or explosion. Since non-fire situations seldom emit these energy signatures, our fire/explosion sensors are highly immune to false alarms and can be installed in the military, tactical & combat vehicles.

The optical UV/IR detector has a very infrared sensor that is designed to detect fuel explosions and fires in enclosed spaces of armoured personnel carriers such as the crew, engine and other compartments. While the Triple IR (IR3) Optical Detector contains a third infrared detector that provides fire signature information to the logic system, located in the control electronics.

250 Milliseconds of Fire Suppression Time

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Air Conditioning, CBRN Filtration and Detection Systems

CBRN Filtration Systems has the function of filtrating war and toxic gas agents so as to ensure healthy respiration of the crew against Chemical, Biological, Nuclear and Radioactive threats which are today's war methods. These systems are used in civilian and military fields.

CBRN Filtration Systems has 3 different usage options that are:

- CBRN Filtration Systems with Positive Pressure
- Masked Type CBRN Filtration Systems and Positive Pressure
- Independent Masked CBRN Filtration Systems.

CBRN Filtration Systems have 3 main system components which are Control Units, CBRN Filters and CBRN Enclosures. The systems have successfully passed high temperature, low temperature, high humidity, shock-vibration and EMI/EMC tests and has the capability to be mechanically integrated to the existing systems of the vehicle.

Masked Type Filtration System

Positive Pressure CBRN System

CBRN Filtration systems can provide conditioned air to the user according to the prevailing conditions and circumstances. It can be integrated into vehicle air-conditioning system for cooling the air. CBRN Filtration Systems offered by Fitech are used on military, civilian vehicles, safety facilities, command shelters and armoured vehicles.

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Masked Type CBRN System

The system protects the crew against chemical, biological, radiological and nuclear threats is provided by blowing adjustable fresh air filtrated by masks within the vehicle attached to private separate lines for each user with Masked Type CBRN System which has 90m3/h air flow rate.

The filtered clean air in masked type systems are delivered to the crew with the help of pipes and hoses. In masked CBRN systems, masks are allocated to each crew with separate lines. According to Nato AEP54 standards, system pipelines and Filters are designed to be 9 m^3 / hour for each crew member in the vehicle.

Our Masked Type CBRN systems solution provides clean air from 2 to 17 crews. This usage can be specially designed considering the customer's requests. The most frequently used CBRN systems in the world are Mask type CBRN systems with Digital CBRN Control boxes.

Technical Specifications

- It gives an error when there is a pressure difference
- Digital Indicator for Pressure measurement
- Shelf life of 10 years
- 16-32VDC Voltage
- Operating Temperature -30°C to +55°C
- Storage Temperature -40°C to +71°C
- 90 m^3/h Air flow

Technical Specifications

- It gives an error when there is a pressure difference
- Analog Indicator for Pressure measurement
- Shelf life of 10 years
- 16-32VDC Voltage
- Operating Temperature -30°C to +55°C
- Storage Temperature -40°C to +71°C
- 80 m^3/h Air flow
- Filtration & Ventilation mode
- High pressure is blown out through blast valve

Positive Pressure CBRN System

Positive Pressure CBRN Systems are mainly used in military vehicles and command shelters. These systems provide filtered clean air from the moment it operates with the in built fans on the environment where CBRN threats occur. The CBRN system increases the pressure of the air vehicle inside where the air is pressed to 200 pascal pressure, depending on the space volume and fan flow, appx 5 seconds after the operation. Positive pressure = Ambient Pressure – Atmospheric pressure.

In positive pressure CBRN systems, air discharge is started after 200 pascal. This discharge is provided by the blast valve. blast valves prevent the pressure of the environment from exceeding 200 pascal with its adjustable spring structure. Positive pressure CBRN systems are designed, manufactured and tested in accordance with NATO AEP54 standards.

Positive pressure CBRN systems are generally used in military vehicles with leak guarantee and in shelters of ground control station. Positive pressure CBRN systems can work in compliance with all types of CBRN filter systems such as cassette type and radial type.

Providing safety to the crew against CBRN attacks which are today's war method

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