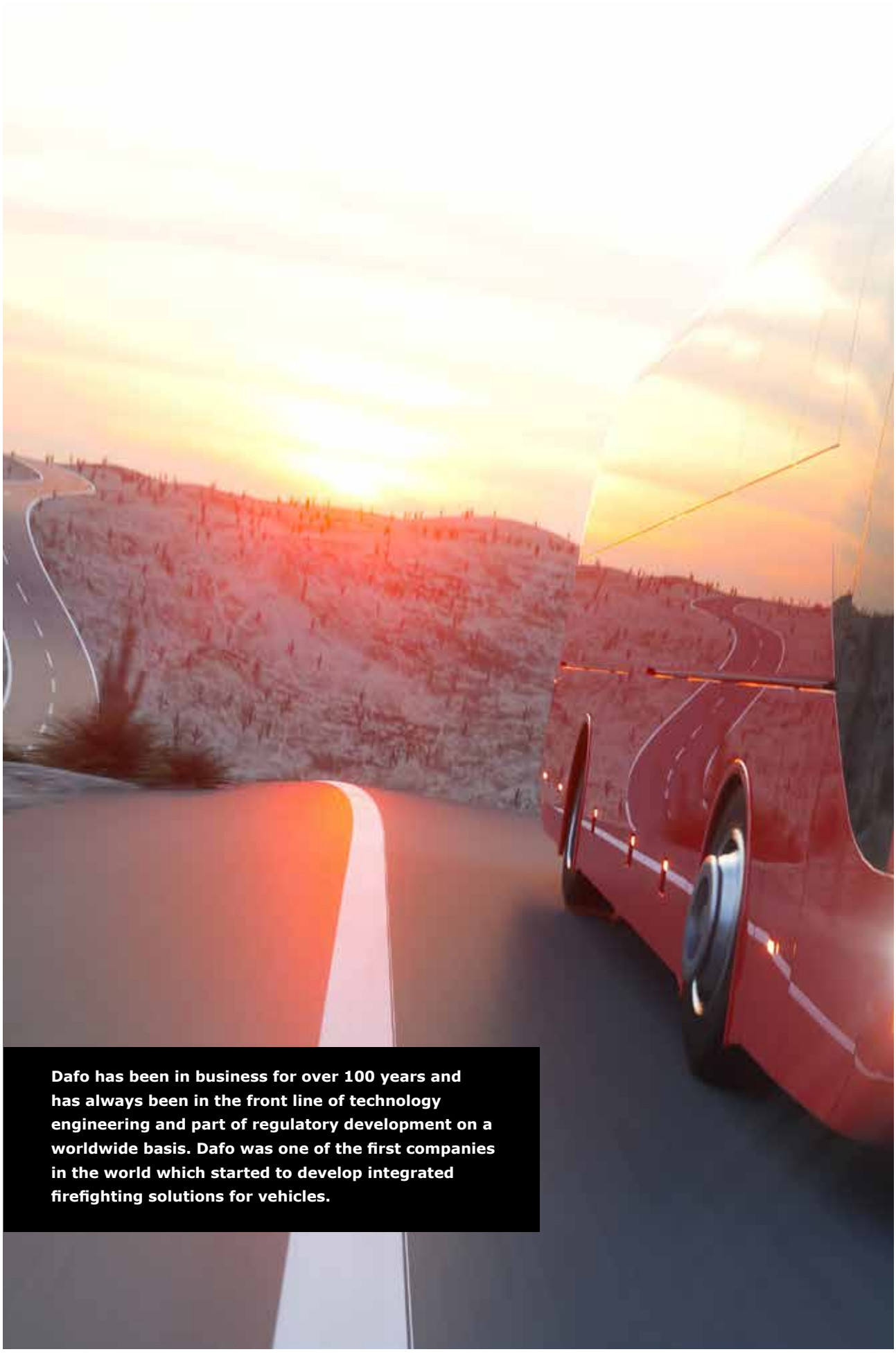
FIRE PROTECTION SYSTEMS FOR BUSES AND COACHES

dafo

vehicle fire protection



Dafo has been in business for over 100 years and has always been in the front line of technology engineering and part of regulatory development on a worldwide basis. Dafo was one of the first companies in the world which started to develop integrated firefighting solutions for vehicles.

Most bus fires start in the engine compartment and surrounding areas. A tested and certified vehicle fire suppression system in combination with a reliable fire detection system is the best first line of response in case of an emergency such as at a thermal incident.

Over the years Dafo has obtained vast experience and knowledge from our end user installations which have been used as a basis for eliminating false alarms and false releases. As a result of the development Dafo can today proudly present three different state of the art reliable solutions for buses and coaches both without vulnerable and pressurized agent containers.

BusLine by Dafo Vehicle

VULCAN by Dafo Vehicle

safEV by Dafo Vehicle

With more than 165,000 vehicle systems sold worldwide, our know-how and experience ensure our customers have the latest technology combined with proven reliability. Our systems are used worldwide as integrated solutions on OEM production lines as well as retrofitted installations for the end user.

Buses operate in various surroundings and climate types such as desert, tropic, arctic, on highways and in mountain terrain. These environments are very challenging also for fire suppression systems. Dafo Vehicle's fire suppression systems are thoroughly tested for fire performance ability and environmental durability such as Electromagnetic Compatibility (EMC), vibration, corrosion and temperature extremes according to international vehicle standards to ensure the highest performance.

Dafo Vehicle's fire suppression systems are approved as a component with regard to UNECE Regulation No. 107, P-marked in accordance with SPCR 183. Further on the systems have fulfilled the requirements of the Australian Standard AS 5062:2016 which is equivalent to the Zambia Bureau of Standards new standard ZS1209/2019.

ARAI®
Progress through Research
AIS-135 approved
Test Report No: SHL/16/2016-2017/10176/1961

I.S. 6278 - approved
Test Certificate Number: 9513215582

Certified Product - AS 5062
Global-Mark.com.au®
ID Number: 103658

UNECE type-approved

Fire suppression system approved as a component with regard to **UNECE Regulation No. 107**

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CERTIFIED

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BusLine
by Dafo Vehicle

Quality, Reliability and Cost Efficiency are essential elements for the automotive industry. Dafo has, in order to meet these high demands, adapted and optimized our well proven system for the high volumes and extensive requirements within the automotive industry.

The name of our new product range is BusLine.

Dafo distribution hubs and manufacturing facilities close to the OEM's manufacturing sites around the globe ensures an efficient and flexible supply chain.

BusLine manages the daily risks and secures your vehicle's uptime.

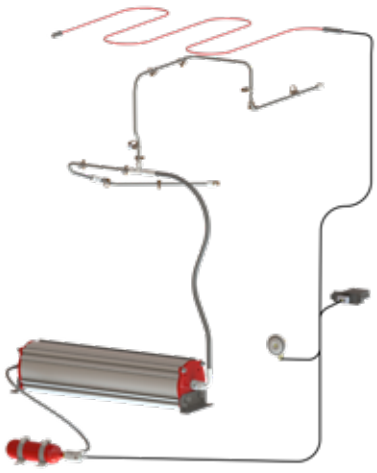
The basic components of the BusLine system are a linear fire detection wire, piping, nozzles and a non-pressurized cylinder. The cylinder contains the suppression agent Forrex which is specially developed to suppress fires in combustion engines. Forrex is highly effective on flammable liquid fires like petrol, diesel and hydraulic oils. The system combines the features of liquid and dry chemical, includes unique and tailor-made solutions, and offers outstanding flame knockdown and unique protection against re-ignition by cooling the overheated engine parts in case of a thermal event.

The pressure for releasing the suppression agent is obtained from a standalone Nitrogen cartridge. This design including a non-pressurized cylinder minimizes the risk of injury as well as potential leakages that normally comes with pressure vessels. The non-pressurized system can be installed independently of any direction.

Once a year the system must be inspected and serviced by a Dafo authorized service provider. Every 10th year an extended service including replacement of suppression agent is required.

Dafo Vehicle's systems are easy to maintain and refill on site which reduce downtime and operational costs.

In case of discharge it is easy to clean off with water and it is also non-corrosive and biodegradable.



BusLine:

- High volume product
- Non-pressurized agent tank
- Forrex extinguishing agent - re-ignition protection
- Low maintenance frequency
- Low total cost of ownership (TCO)
- Low environmental footprint

VULCAN
by Dafo Vehicle

The Vulcan system is our top of the line brand which has been developed to meet the most challenging demands.

The basic components of the Vulcan system are a linear fire detection wire, piping, nozzles and a non-pressurized cylinder. Instead of obtaining the pressure for releasing the suppression agent through a standalone Nitrogen cartridge the pressure is obtained from an integrated actuator system in the cylinder.

With fewer components included as part of the system design the installation time will be shorter and the time for the supply chain material handling process will be kept at a minimum.

Once a year the system must be inspected and serviced by a Dafo authorized service provider. Every 15th year an extended service is required.

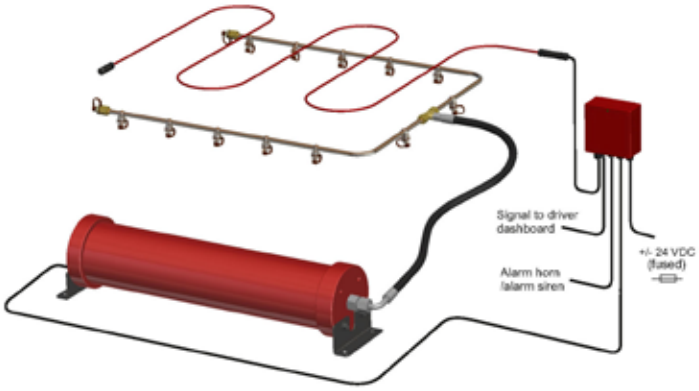
A low total cost of ownership (TCO) is an important key factor for every bus operator. The Vulcan fire suppression system, with its superior low maintenance frequency and reliability contributes to increased profitability through less downtime for the operator.

Dafo Vehicle Fire Protection is currently working with our OEM customers by integrating our systems into their communication protocols.

Dafo Vehicle Fire Protection is working focused on sustainability, meaning environmental sensitivity without compromising safety. Measuring and mitigating impacts from manufacture to end-of-life is of great importance. The Vulcan system with its optimized design resulting in fewer components, extended service intervals and the non-existing need of spare parts enables Dafo and our customers to reduce the environmental footprint.

Vulcan:

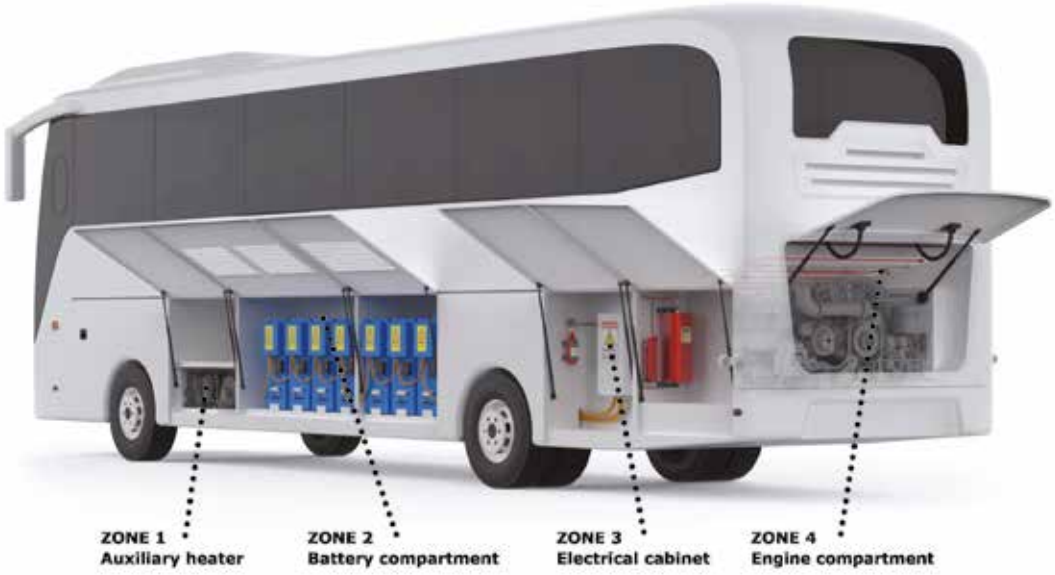
- Complete system non-pressurized
- Forrex extinguishing agent - re-ignition protection
- Fewer components – shorter installation time
- Low maintenance frequency
- Low total cost of ownership (TCO)
- Low environmental footprint



Currently there is no comprehensive solution for fire mitigation available on the market for electric (EV) and hybrid vehicles (HEV). However, Dafo Vehicle Fire Protection has developed a full coverage interim multi-zone fire protection solution in response to the urgent need.

The newly developed suppression agent Forrex EV has been adapted to the specific needs and characteristics of EV and HEV. Forrex EV is used as one part of the complex system solution and it provides effective cooling capacity to slow the fire development for allowing safe evacuation of passengers.

In order to cover all risk areas in an EV or HEV bus the main risk scenarios are divided into four protection zones.



The different protection zones are then protected in various ways by robust detection and suppression systems – both liquid based and gas-based solutions. Li-ion batteries are still a relatively new technology and Li-ion battery safety is a recent research area. Regulations and standards are to some extent lagging behind. Dafo Vehicle Fire Protection is in the forefront of the development as by participating in several research projects on how to deal with fire hazards of Li-ion batteries in vehicles in order to provide solutions for to reducing the risks and consequences of a thermal incident in or in connection with Li-ion batteries in heavy commercial HEVs and EVs such as buses and trucks.

Dafo Vehicle Fire Protection is leading one of the most advanced research projects called Li-IonFire® funded under the EU Framework Program for Research and Innovation – H2020 – under the SME Funding Scheme.

Dafo^{CLOUD}

The Dafo^{CLOUD} is a cloud-based risk management system to provide full overview of lifecycle of Fire Detection and Suppression System (FDSS).

The Dafo^{CLOUD} provides access to the full history and genealogy of sub-systems of the FDSS and the complete information is seamlessly accessible and updatable by relevant stakeholders.

The restricted access database contains information about the whole life cycle of each FDSS:

Manufacturing

• The electrical sub-systems of FDSS are always individually tested, programmed and configured by using equipment connected to Dafo^{CLOUD} which enables full control and visibility about detailed test reports but also firmware files, settings and configurations used over the time.

Installation

• The FDSS-specific installation documentation is accessible for technicians via Dafo^{CLOUD}.

Maintenance

• Both planned and unplanned maintenance activities, including associated time-stamped reports, photos/videos and reminders for next actions will be stored and handled by Dafo^{CLOUD}.
• Historical event logs of Control Units can be accessed from Dafo^{CLOUD} for in-depth analysis

The Dafo^{CLOUD} is the basis for reducing and controlling the total cost of ownership with keeping maximized safety in focus.

Service

Spare Parts

CLOUD

Quality
Records

Diagnostics

Safe with Dafo

Active fire protection is an integral part of systematic and effective fire prevention. Together with Dafo Vehicle Fire Protection, you'll always get the most effective solution so that you can limit fire damage, reduce downtime and increase productivity.

Since the start back in 1919, Dafo has developed into a modern, high-tech company committed to offer the very best solutions to our customers.

Dafo Vehicle Fire Protection has three main business areas: Integration (Fire suppression systems integration into OEM production line, Retrofit (Fire suppression systems installed at final customer) as well as Service & Maintenance.

The Dafo group today consist of several subsidiaries and Dafo dealers – Dafo Oy (Finland), Dafo US, Dafo Deutschland, Dafo Russia, Dafo Asia, Dafo Spain, Dafo UK & Ireland, Dafo Brasil, Dafo Middle East & Dafo Chile.

Do not compromise safety – contact Dafo Vehicle Fire Protection already now!

@dafovehicle

vehicle fire protection

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