VID FIREKILL
LOW PRESSURE WATERMIST

Road and Rail Tunnels Fire Protection

VID FIREKILL is a world leading innovative developer and manufacturer of low pressure water mist systems.

Safety in Tunnels

Why install a fixed firefighting system in tunnels?

Over the past decades, traffic intensity has increased dramatically around the globe, and so has the number of road tunnels being constructed. Tunnels are typically long confined spaces with limited escape routes, and a fire inside these structures can have serious consequences for people, can cause severe structural damage to the tunnel as well as long-term closure of important main roads crucial for the society.

The most feared tunnel fire scenarios are those involving heavy goods vehicles, which pose a significant risk of large fires with high temperatures and toxic smoke due to their size and heavy weight and which often transport a combustible cargo.

Basic reflection

Many stakeholders logically ask themselves immediately the question: What is the best and/or most cost effective?

- Active fire protection?
- Passive fire protection?
- A combination of the both?

To answer this crucial question, it is important to handle each project individually, as several factors could play an important role in the decision making:

- Traffic and risks, e.g. HGV's, combustible loads and/or design fire HRR?
- Uni-/ or bi-directional tunnels?
- Subsea tunnel?
- How critical is the society impact by a closure of an important tunnel road network?
- How critical is the financial impact by a closure of a tunnel e.g. in time and lost tolls?

Experiences with fixed fire-fighting system in tunnels

The extensive number of full scale tunnel fire tests conducted in recent years as well as real fire incidents with vehicles in road tunnel has demonstrated that fixed firefighting systems in road tunnels can provide significant safety and successfully suppress and control even large heavy goods vehicle fires. That is why investing in a robust fire suppression system is paramount to creating a secure environment to safeguard the lives and ensure structural protection of a tunnel, as well as to provide faster and safer access for fire/rescue personnel to a vehicle fire.

Maximized efficiency and performances with low pressure water mist technology

TUNPROTEC® System is an innovative low pressure water mist based fire protection system designed to minimize installation and maintenance costs, while ensuring fast and reliable protection of people and tunnel structures from vehicle fires.

BENEFITS OF OUR LOW PRESSURE WATER MIST SYSTEM

■ Reliable tunnel fire protection

The TUNPROTEC® system facilitates control of fire at its early stage preventing heat build-up, fire growth, and fire spread between vehicles as well as reducing smoke hazards. The system fights fires fast and effectively and enables safe evacuation and easy access for rescue workers.

■ Successfully tested and approved

The TUNPROTEC® low pressure water mist system is full-scale fire tested re. UpTuN WP2 D251 up to 250 MW and approved to cover all kind of tunnels and underground facilities from fire. The system complies with NFPA 750 and EN 14972 standards.

■ Environmentally friendly

The TUNPROTEC® system requires 60-90% less water compared to sprinkler & deluge systems and much less energy compared to high pressure water mist systems. With lower water consumption and lower water pressure our system is the most environmentally friendly solution found on the market.

■ Cost effective and resource saving

The TUNPROTEC® system can be designed with smaller system components (e.g., tank, pump, pipes, and fittings) resulting in cost and space savings - a particularly important advantage at refurbishment projects. Further, installation work can be done fast and easy.

- Low water requirements
- Low water pressure
- Low electricity requirements
- 100% safe for people
- 100% safe for the environment
- Minimal water damaging
- Fast, robust and reliable
- Easy to install and maintain
- Cost effective
- Resource and space savings

Sustainable solution
Reduced CO2 emissions up to 70%
Sustainable fire safety design
Reduced production footprint

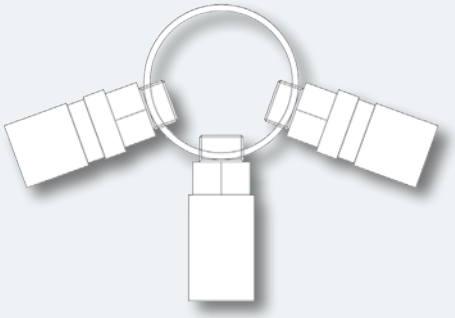
Water saving
Uses 80% less water than traditional deluge systems

Energy efficient
Low energy consumption

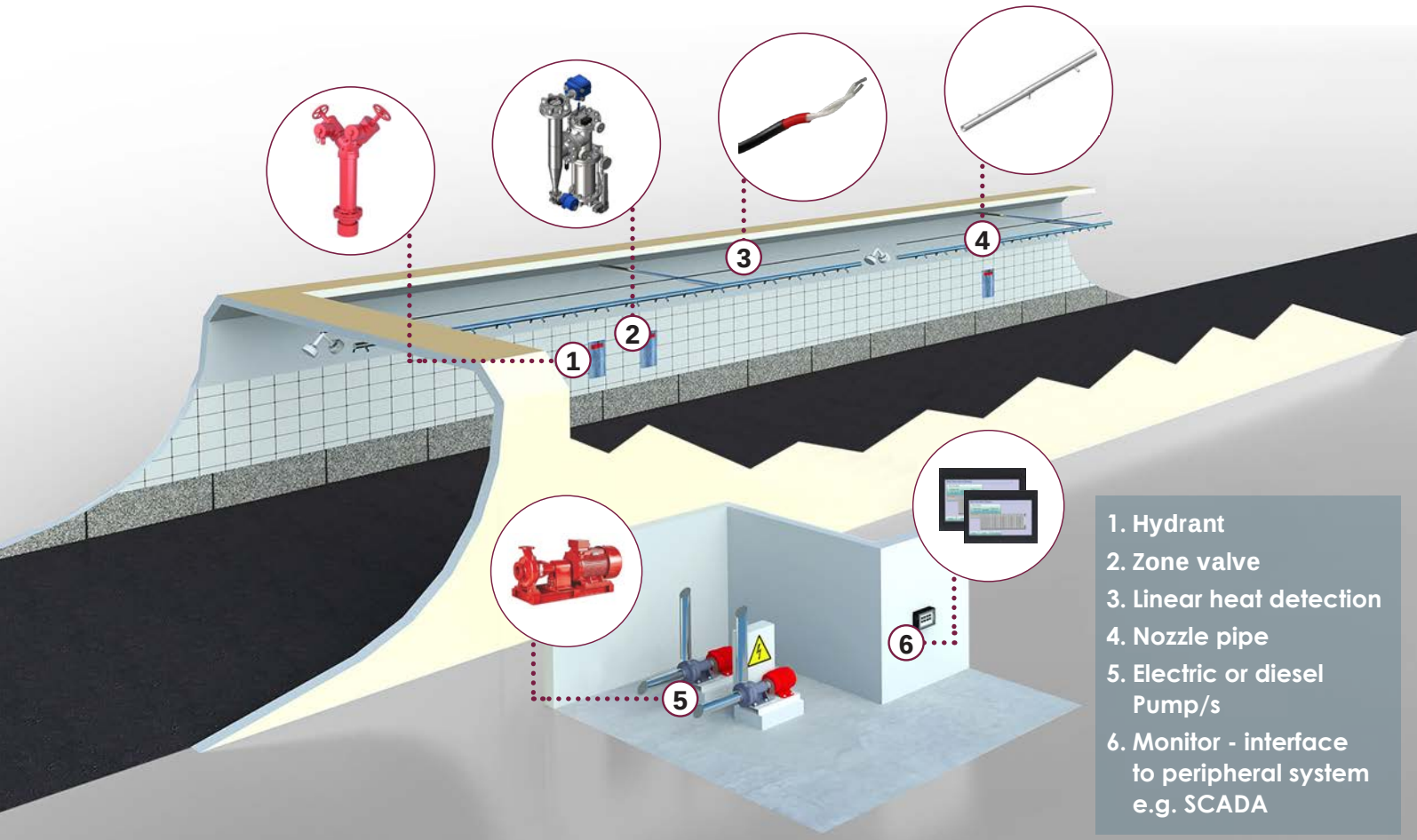
TUNPROTEC® - a unique solution for road and rail tunnels fire protection

Unique nozzle pipe configuration

The TUNPROTEC® nozzle pipes are supplied in 6-meter-long pipes and features 18 threaded holes in three different orientations, which allows for quick installation of the model BM-1 low pressure water mist nozzles. The threaded hole pattern repeats for every one meter of the nozzle pipe to ensure the correct spacing and orientation.



TUNPROTEC® system overview



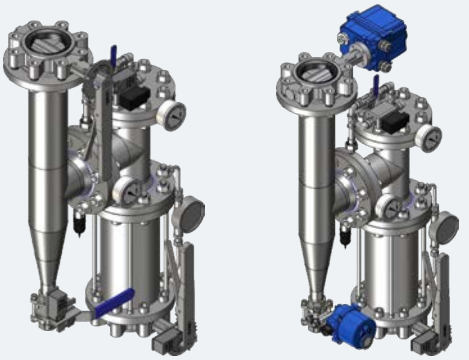
1. Hydrant
2. Zone valve
3. Linear heat detection
4. Nozzle pipe
5. Electric or diesel Pump/s
6. Monitor - interface to peripheral system e.g. SCADA

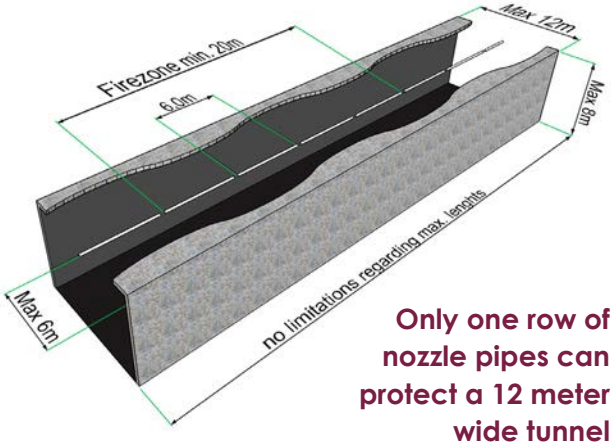
TUNPROTEC® - a unique tunnel fire protection solution. How it works?

- The TUNPROTEC® solution works as a zoned deluge system.
- The entire tunnel is divided into fire zones.
- Each fire zone is typically 20 - 30 meters long.
- One central installed nozzle pipe can protect a tunnel width up to 12 m.
- For wider tunnels, an additional parallel nozzle pipe must be installed to protect the tunnel.
- No limitations regarding maximum length of a tunnel.

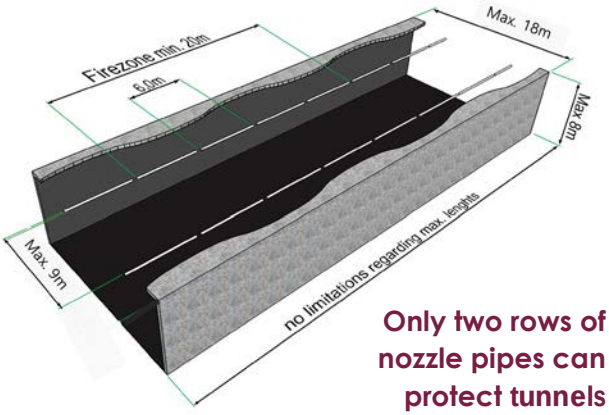
Multiple zone valve options

TUNPROTEC® offers multiple zone valve options, to match requirements and needs. TUNPROTEC® Zone Valves can be supplied with remote self-test functionality.





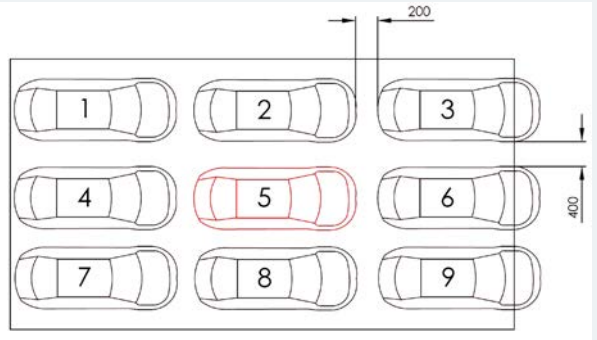
Only one row of nozzle pipes can protect a 12 meter wide tunnel



Only two rows of nozzle pipes can protect tunnels wider than 12 meters

Effective EV fire protection

The introduction of new propulsion systems on vehicles also places completely new demands on firefighting safety measures. Fire risks from electric vehicles are an increasing concern, due to high temperatures involved, and rapid spreading to adjacent vehicles. VID FIREKILL together with DBI – the Danish Institute of Fire and Security carried out and tested our solution to address these concerns within the ELBAS project.



The EV Car was a Tesla model 3, with a new battery used for the experiment. The water mist system was activated 7,5 minutes after the first detector reported a fire. At this point the fire had spread to the adjacent cars. All 9 cars had caught fire mainly at the bumpers and tires.

Temperature in the battery pack

VID FIREKILL`s low pressure water mist solution demonstrated superior performance on EV fires. The EV battery was reduced from 880 °C to 70 °C within 15 minutes of system activation. 30 minutes after activation of the water mist system, the battery temperature was reduced to a merely 30 °C.

TUNPROTEC® - compensation effects of Installing the system

The most important compensatory effects of installing our low pressure water mist system are highlighted below

Ventilation & critical velocity

Thanks to the significant smoke reduction and cooling of smokes after activating the TUNPROTEC ® system:

- The number or capacity of jet fans can be substantially reduced.
- In certain cases, longitudinal ventilation can be used instead of planned semi-transversal, transversal ventilation systems or smoke extraction systems.

Structural protection

Due to the excellent cooling effect of the TUNPROTEC ® system and its ability to absorb heat from a tunnel fire makes it possible to:

- Eliminate or reduce planned passive fire protection.
- Allow for lower fire rated components within the tunnel e.g. electrical installations.

Improved risk analysis

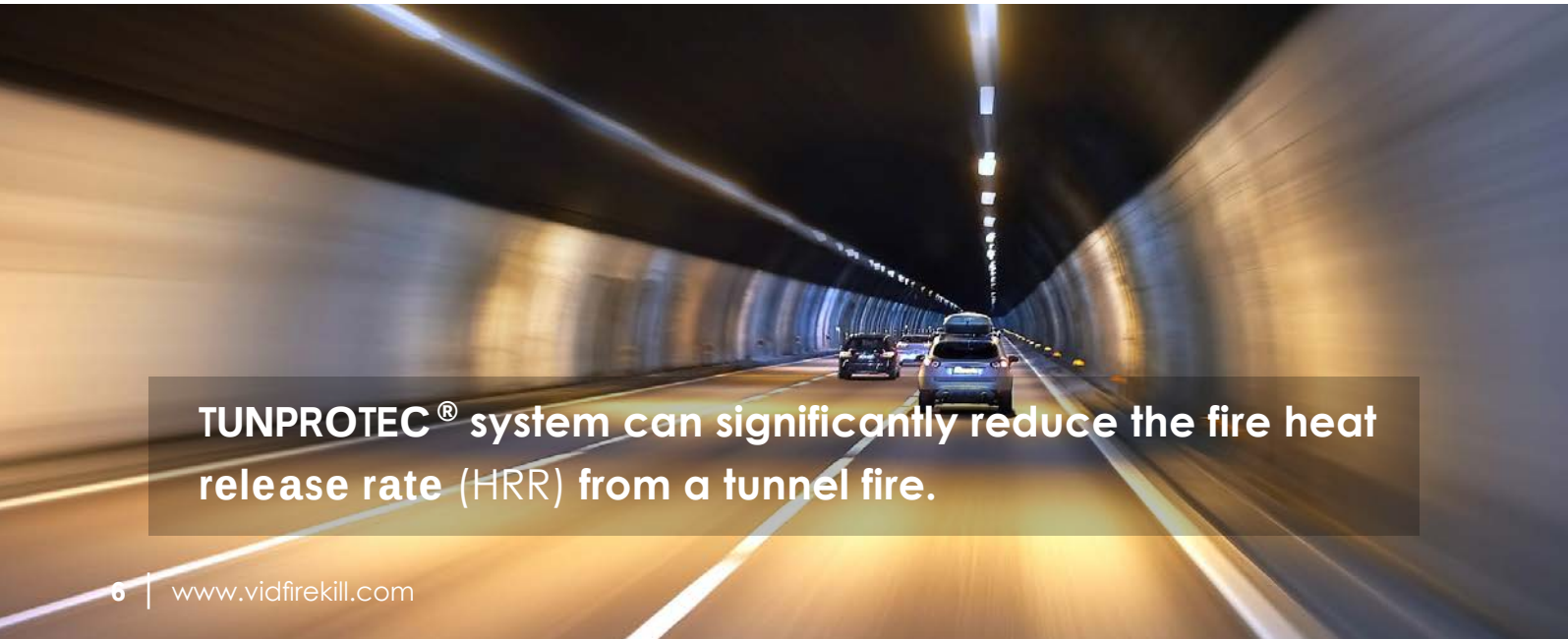
Installing the TUNPROTEC ® system allows for more sound strategies e.g.:

- Higher traffic intensity
- Transport of hazardous and potentially combustible cargo through the tunnel
- Implementation of safer evacuation strategies.

Potential available compensatory effects

- Increased level of life safety
- Quick re-opening after a fire
- Quicker and easier access for rescue/ fire service
- Reduction of insurance costs
- Protection of the tunnel structure
- Avoiding or minimizing passive fire
- Lower life cycle costs protection
- Significantly smaller ventilation system

The compensation effects make it possible to balance the investment of a fixed Fire Fighting System by recognizing the compensation effects in the total ROI.



TUNPROTEC® system can significantly reduce the fire heat release rate (HRR) from a tunnel fire.

TESTS and APPROVALS

Full scale tunnel fire testing up to **250 MW**

RELIABILITY ACCORDING TO THE HIGHEST STANDARDS

Our TUNPROTEC® system complies with the global standards that currently defines the requirements for tunnels and underground infrastructure facilities fire protection. The system completely protects people, tunnel's structure and the environment.

TUNPROTEC® is fully tested and approved

Our system is fully tested and approved to protect any type of road and rail tunnels. Our TUNPROTEC® system has successfully been tested for class A and B fires:

- Runehamar tests (RISE) full scale tunnel fire testing 30 - 100 MW;
- San Pedro de Anes (Efectis) full scale tunnel fire testing 250 MW.

TUNPROTEC® has four levels of approvals

In addition to fire tests, all system components have passed tests proving their strength and reliability. The TUNPROTEC® valves and nozzles hold the following approvals:

- MSC circ. 1165 water mist nozzle component test approval;
- NHV-Valves tested for 1000 operations cycles and been corrosion tested according to CEN/TS 14972;
- SIL 2 approval available upon request;
- Die-Electrical test according to EN 3-7 ≤ 52 kV. In addition, our factory is ISO 9001 and ISO 14001 certified and approved. Our TUNPROTEC® system also holds Approval Certificate for protection of road tunnels against Fire Effects by IBS Institut für Brand – Schutztechnik und Sicherheitsforschung.

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