



VID FIREKILL

Fixed Fire Fighting Systems for Road and Rail Tunnels




TUNPROTEC® by VID FIREKILL

The TUNPROTEC® Fixed Fire Fighting system is developed and manufactured by VID Fire-Kill located in Svendborg, Denmark.

VID Fire-Kill is a world leading innovative developer and manufacturer of water based firefighting products, specializing in fixed water-based systems utilizing environmentally friendly firefighting methods. We offer a large range of successfully tested and approved products matching our customer's individual requirements, and we always strive for the highest possible quality.

All our products are unique, offering either a better performance, a better approval, or a better solution than what is found on the market today. With the advances in watermist fire protection technology and the continued addition of VID Fire-Kill products, approvals, and covered applications, we form the spearhead of the fire protection industry.

The TUNPROTEC® Low Pressure Watermist Fixed Fire Fighting System has been designed to fight fires in tunnels fast and effectively and enable safe evacuation. With the TUNPROTEC® Fixed Fire Fighting System installed both life safety and asset protection are significantly improved.



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

Why Install a Fixed Fire Fighting System?

Over the past decades, traffic intensity has increased dramatically around the globe, and so has the number of road tunnels being constructed. Tunnels are long confined spaces with limited escape routes, and a fire inside these structures can have catastrophic consequences for the people involved and cause severe structural damage and temporary tunnel closure. Though many modern tunnels are equipped with the latest safety systems, the risk of fire still lurks. Most tunnel fires are caused by collision, or overheated brakes, tires, or engines. Some of the most feared tunnel fire scenarios are those involving heavy goods vehicles as they present a significant risk of large fires due to their heavy weight and often combustible load.

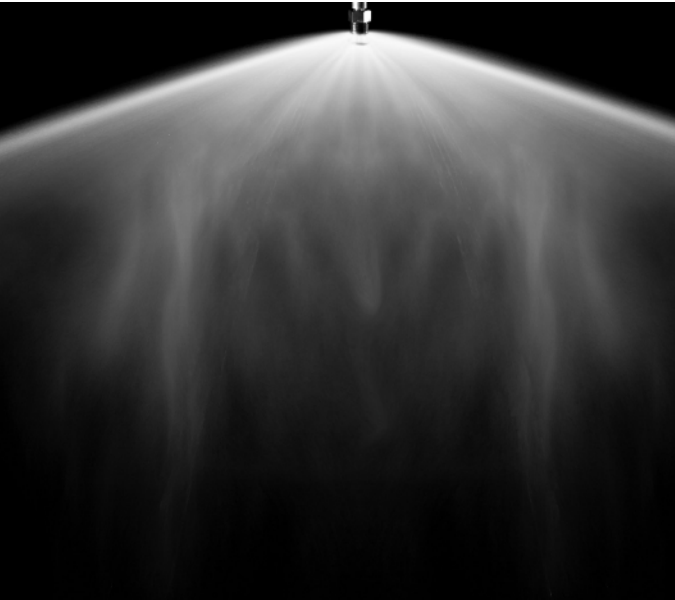
The extensive number of full-scale tunnel fire tests conducted in recent years has demonstrated that Fixed Fire Fighting systems in road tunnels can provide significant safety benefits and successfully suppress and control even large HGV fires >250 MW.

The installation of a Fixed Fire Fighting System will:

- Provide life safety
- Ensure protection/function of emergency lighting, ventilation and/or smoke extraction systems during a fire and evacuation
- Prevent structural damage and tunnel collapse
- Ensure quick re-opening of the tunnel and important infrastructure network after a fire

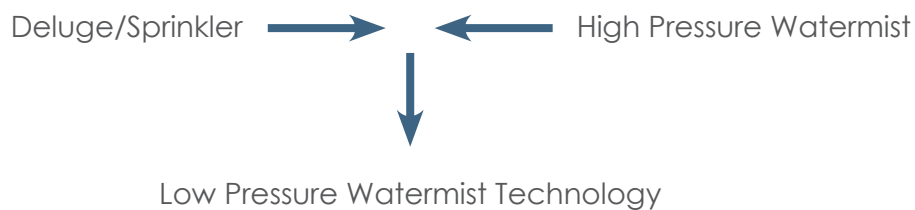


Low Pressure Watermist Technology



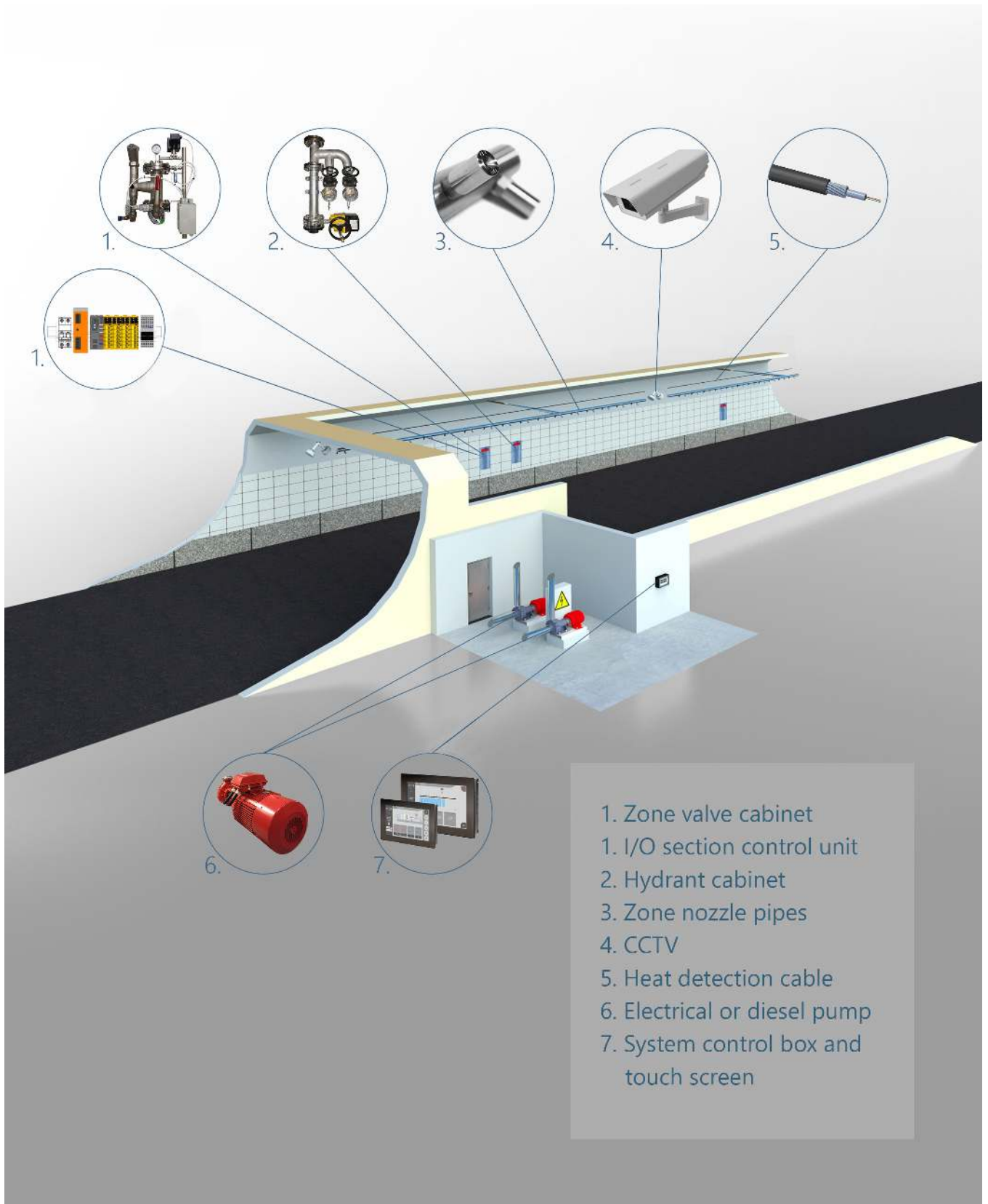
The definition of watermist as utilized by TUNPROTEC® is defined as a unique mix of small droplet sizes compliant with CEN/TS 14972 (dv.0.90), meaning that 90% of all water must be distributed in droplets less than 1000 microns = 1 mm. The small droplet sizes and the high velocity when distributed out of the nozzle orifices allows the TUNPROTEC® system to effectively control and suppress tunnel fires with a typical 80% reduction in water consumption compared to e.g. a Deluge system, and with substantially lower power-/pressure requirements compared to e.g. high-pressure watermist systems.

Combining the Best of Two Technologies

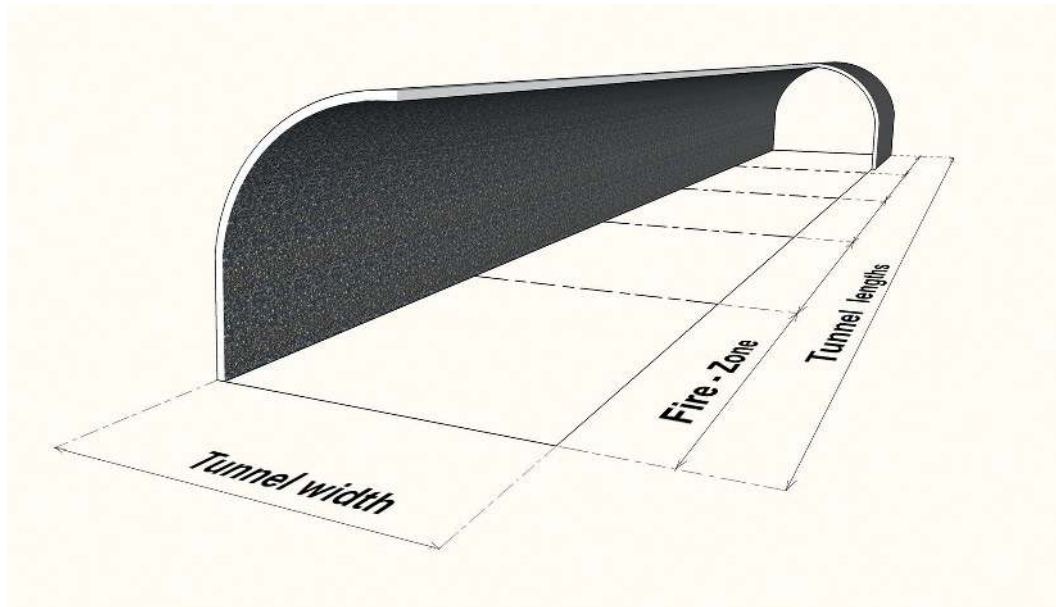


- Robustness and low maintenance requirements
- Low power consumption and water pressure
- Cost efficient = utilizing PN 16 components
- Low water consumption

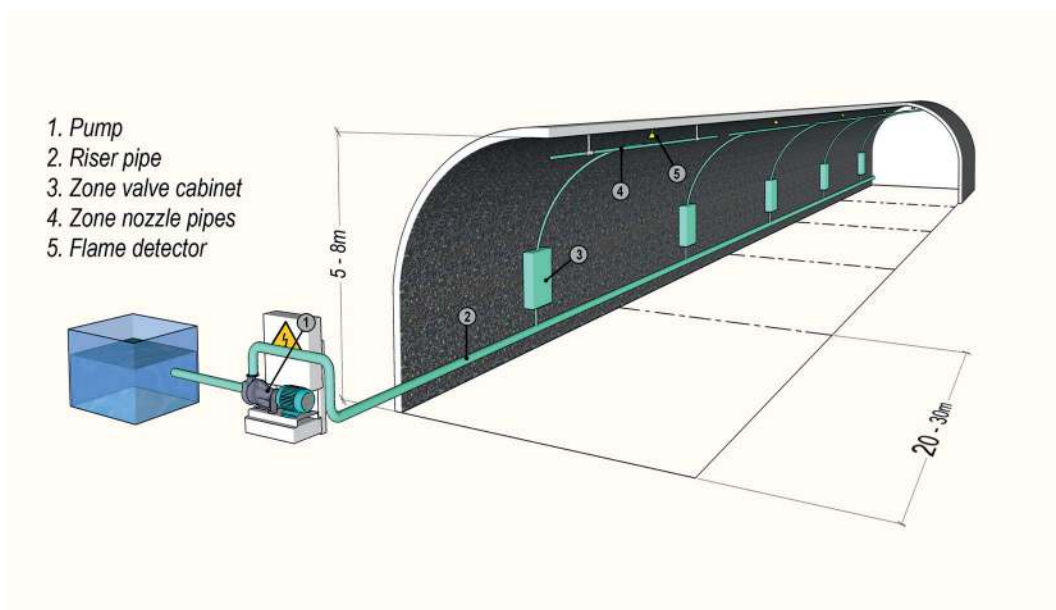
System Overview



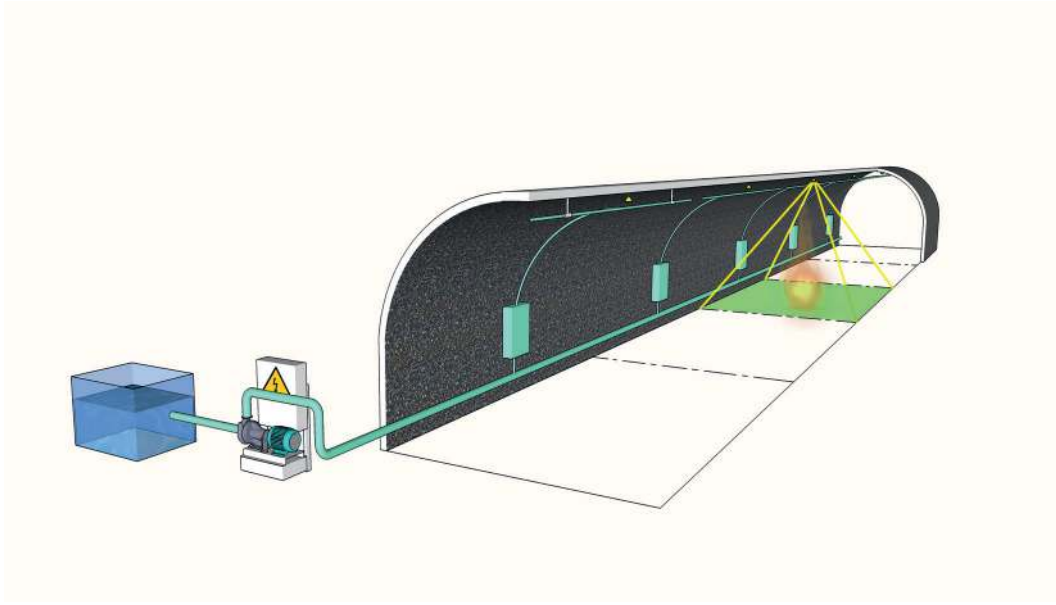
The TUNPROTEC® Tunnel Solution (Design and Function)



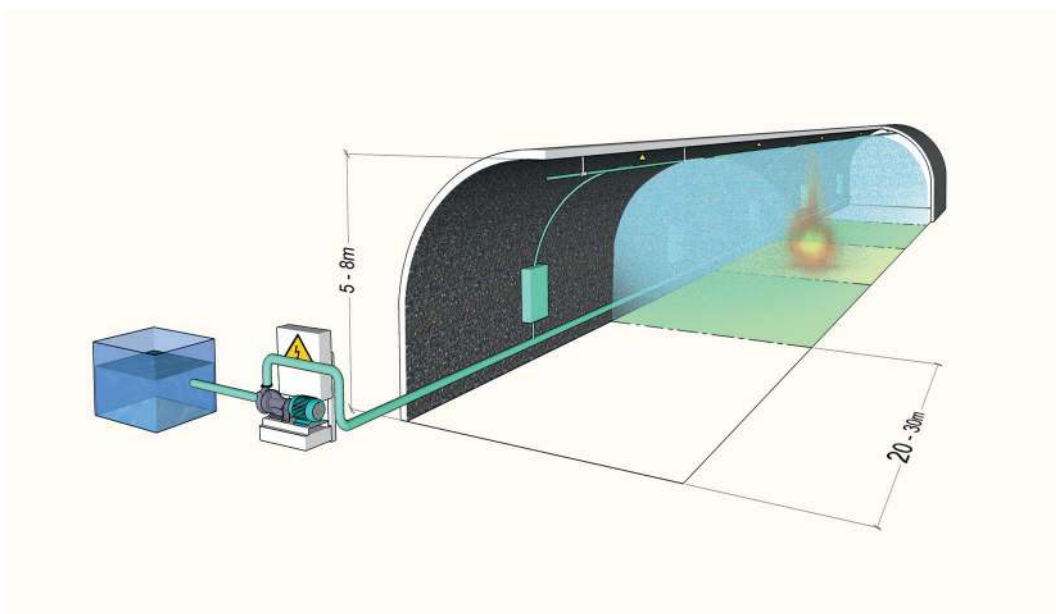
The TUNPROTEC® solution works as a zoned deluge system where the entire tunnel is divided into fire-zones.



Each fire-zone is typically 20 - 30 m long and 8 m high. One central installed nozzle line can protect a tunnel width up to 12 m. If wider, an additional nozzle line must be installed.



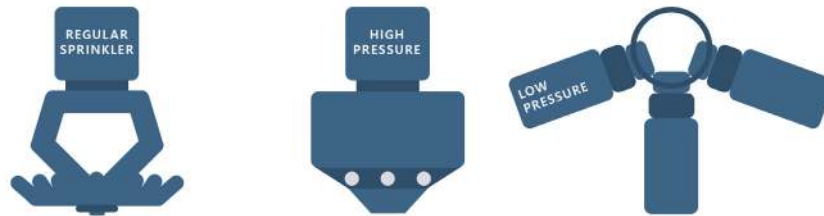
When a fire is detected in a fire-zone, the detection system sends a signal to the TUNPROTEC® Zone Valve Control Panel.



The Zone Valve Control Panel activates the TUNPROTEC® section valve within the fire-zone and additional 2 adjacent fire-zones, while signaling the Interface Panel to alarm any connected alarm systems. By activating the adjacent fire-zones, the TUNPROTEC® system effectively suppresses and isolates the fire, preventing it from spreading.

Technical Comparison

Example of a 12 m wide tunnel with 3 x 25 m active fire zones



WATER CONSUMPTION (RESERVOIR)



PIPING (RISER PIPE)



POWER CONSUMPTION (PUMP)



Tests and Approvals



Full scale tunnel fire testing in Runehammar test tunnel



Full scale tunnel fire testing at APPLUS test center in san Pedro de Anes in Spain



The TUNPROTEC® system has successfully been tested for class A and B fires:

- Runehammar tests (RISE) full scale tunnel fire testing 30 – 100 MW
- San Pedro de Anes (Efectis) full scale tunnel fire testing 250 MW



The TUNPROTEC® valves and nozzles hold the following approvals:

- MSC circ. 1165 watermist 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 EN3-7 ≤ 52 kV



Compensation Effects of Installing a Fixed Fire Fighting System

It is known that a Fixed Fire Fighting System can significantly reduce the fire heat release rate HRR from a tunnel fire, but the practical or potential to exploit the compensatory effects of an installed Fixed Fire Fighting System is less known or, in many cases, not utilized. The most important compensatory effects are highlighted below.



Ventilation & critical velocity

Thanks to the significant smoke reduction and cooling of smokes after activating the Fixed Fire Fighting 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 Fixed Fire Fighting 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 a Fixed Fire Fighting 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

Overview of potential available compensatory effects:

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

NB: 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

Other Application Areas



Train and metro tunnels



Mining tunnels



Cable tunnels



Train and metro stations and platforms





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