

The total fire protection solution for tunnels



The power behind **your mission**



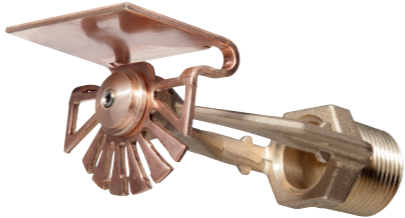
Expert fire protection for tunnels

Johnson Controls provides a complete fire protection solution to safeguard the infrastructure of tunnels. Whether it is rail, road or other underground constructions, we provide the equipment and expertise for the most challenging and crucial tunnel structures in the world.

With more than a billion vehicles on the road, traffic infrastructure has become critical to the performance of businesses and individuals. Such reliance has resulted in the demand for superior transportation networks and an increase in the number of tunnels being constructed around the world.

Protecting tunnels against fire hazards poses many unique challenges. Tunnels see every type of vehicle and possible fuel load. Further, congestion and the potential for large fires create the need for a fire protection system that increases safety by minimising the risk of fire propagation. Our innovative fire suppression solutions help to control and suppress fire even in the most challenging environments. Our systems help to manage fire risks and keep people, assets and the environment safe.

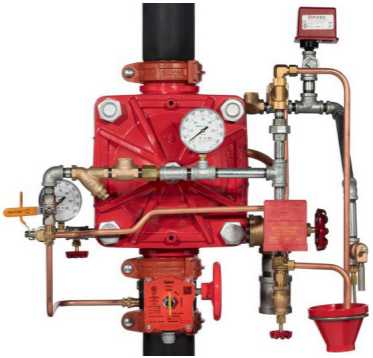
We combine products from our range of innovative, market-leading brands to provide a turnkey solution for tunnel fire protection.



Tunnel Nozzles
TYCO TN-25 and TN-17 Horizontal Spray Sidewall Nozzles are intended for integration into a water spray deluge fire protection system. They are UL-listed nozzles that have also been independently tested and proven to suppress or control large-scale tunnel fires.



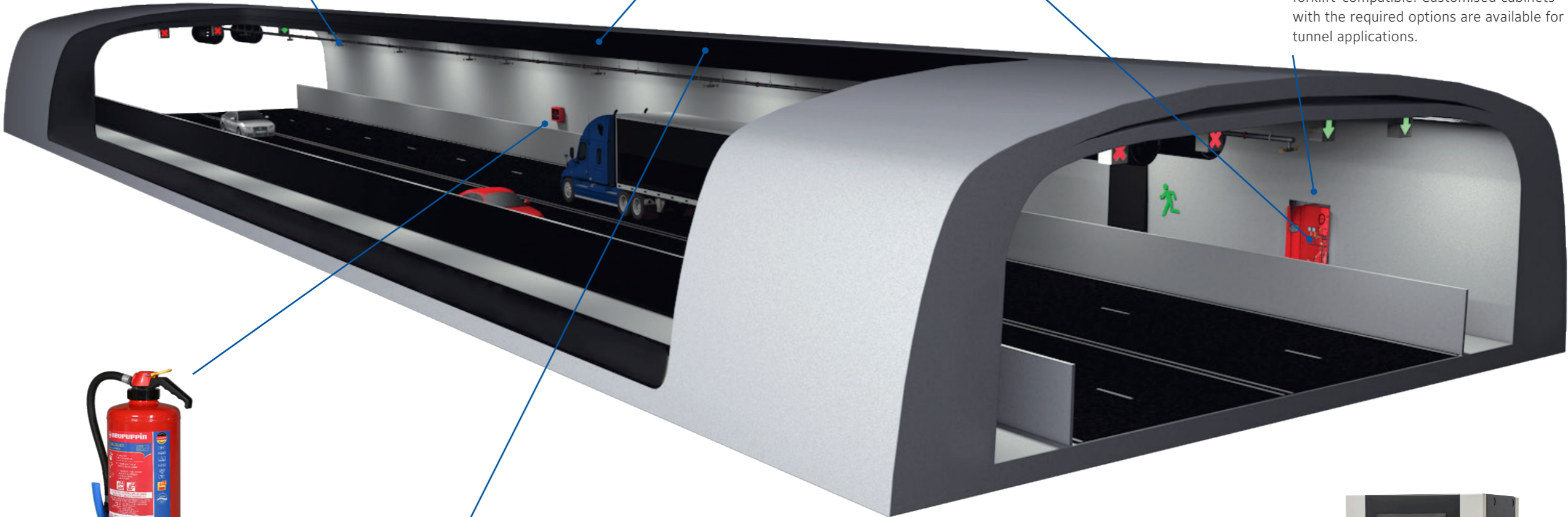
Grinnell G-Fire Piping and Couplings
Grinnell delivers quality grooved piping solutions for a full range of fire applications.



Deluge Valves
TYCO Remote-Resetting, Pressure-Reducing DV-5A Deluge Valves (or DV-5 on request) can be opened and closed during a full-flow condition from a remote location. A pressure-reducing function maintains pre-set outlet.



Valve Cabinets
The Red-E Cabinet is a pre-assembled, pre-wired and pre-tested fire protection valve package designed to occupy minimal floor space and provide an enclosure for the valve riser. The valve riser has a grooved connection to minimise installation time. Unit also features industrial-grade rollers for mobility and is forklift-compatible. Customised cabinets with the required options are available for tunnel applications.



Extinguishers
Johnson Controls Portable and Wheeled Extinguishers set the benchmark for reliability and service-friendly design. We combine high performance and environmentally safe agents to offer a comprehensive portfolio of products to address all types of fire risks, including lithium-ion battery fires.



Detectors
The ZETTLER SensorLaserPlus™ is designed for fast and continuous fire detection even in difficult and varying ambient conditions.



Public address and voice alarm system
The new voice evacuation system from ZETTLER features audio messaging. In a fire hazard or other emergency, it facilitates the quick evacuation of tunnels and helps promptly move people to safe locations.



PROFILE Flexible Control Panels
PROFILE Flexible from ZETTLER is a powerful fire detection and alarm system that has MZX Technology at its heart.

Purpose-built tunnel protection

Low cost and ease of operation

TN is the most robust solution on the market for tunnel fire protection.

- Low installation costs with one simple branch line solution
- Low operation costs as simple design means less maintenance
- Pressure-reducing function maintains pre-set outlet pressure
- Remote-resetting feature provides the ability to reset the valve from one or more locations
- Compact, space-saving cabinet design to reduce the valve room footprint and construction costs
- Heat Release Rate kept below 30 MW
- Acceptable visibility during full operation
- One feed connection for both hydrant and water spray system

TYCO TN Tunnel Systems are specifically engineered to address fire protection challenges in tunnels. The improved coverage area per water spray nozzle is intended to minimise the total number of nozzles required.

Further, the greater stream diameter and lower pressure of the nozzles result in larger water droplets. This means water can be effectively delivered to penetrate the plume and reach fuel faster. This results in efficient wetting and cooling of fuel and tunnel surfaces.

Both the TN-17 and TN-25 nozzles generally require only a single pipe to help protect up to 65 feet (approximately 20m) of tunnel width,

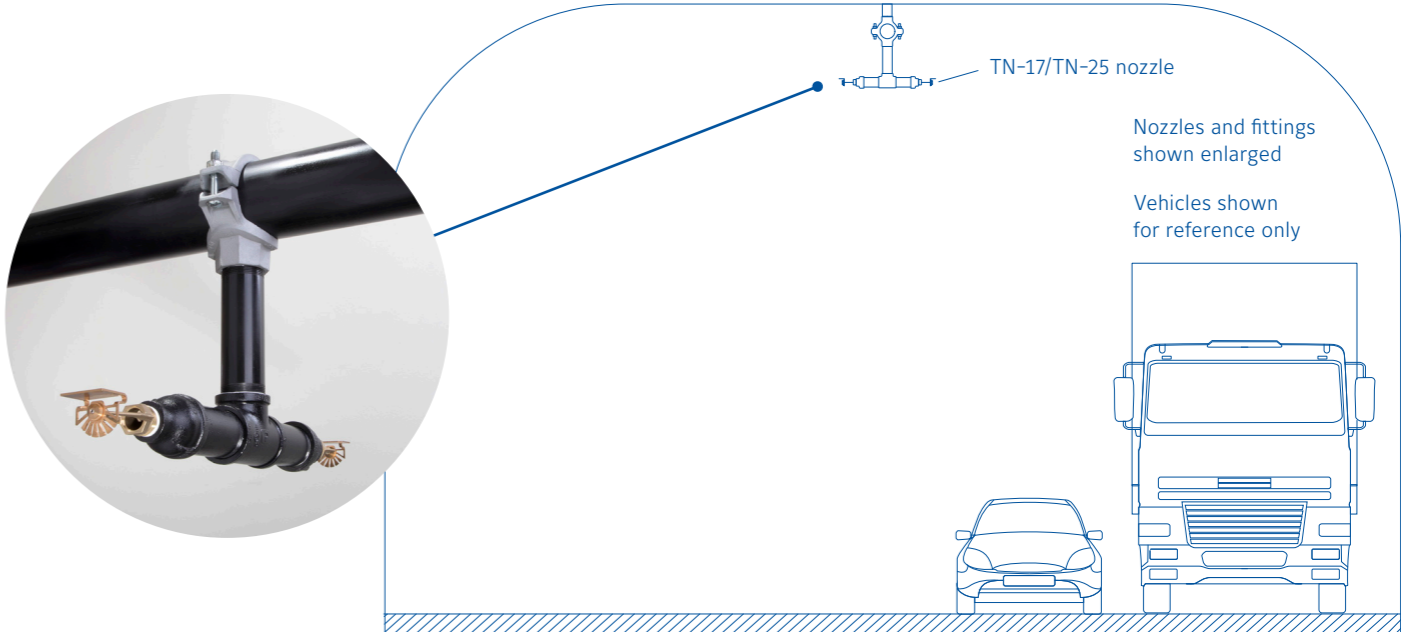
with the nozzles installed in a back-to-back configuration. Wider tunnels can be fully protected however with a double- or triple-pipe setup.

Minimal fittings and couplings are required for fewer installed nozzles. This results in reduced installation times and less materials used.

Easy integrated maintenance and performance testing means that piping can be flushed at regular intervals by discharging deluge zones.

Valve cabinets can be customised for unique tunnel installations. Standard pressure reducing and remote re-setting deluge valves are available.

TN-17 / TN-25 tunnel protection



Actual tunnel test parameters:

- Obstructed Class A large-scale fire testing.
- Ventilation – 7 mph (3m/s) forced, throughout.
- Detection system activated at 141°C.

Actual tunnel test results:

- TN17 and TN25 proven to control or suppress.
- Gas temperatures well below design threshold.
- Peak HRR remained below design threshold.

TN-17		TN-25	
Operating Pressure	Approximate Coverage Area	Operating Pressure	Approximate Coverage Area
10 psi (0.7 bar)	16ft-4in. x 24ft-7in. (5m) x (7.5m)	7 psi (0.5 bar)	14ft. x 16ft. (4.3m) x (4.9m)
up to 30 psi (2.1 bar)	16ft-4in. x 32ft-8in. (5m) x (10m)	up to 30 psi (2.1 bar)	16ft-4in x 24ft-7in (5m) x (7.5m)

Refer to Technical Data Sheets TFP850 and TFP852 for complete coverage area and pressure specifications

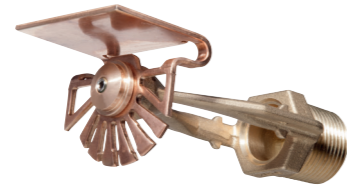
	TN-17	TN-25
K-factor	16.8 gpm/psi 1/2 (241.9 lpm/bar1/2)	25.2 gpm/psi 1/2 (360 lpm/bar1/2)
Pipe thread connections	3/4" NPT or ISO 7-R 3/4	1" NPT or ISO 7-R 1
Maximum coverage area	16ft-4in. x 32ft-8in. (5.0m x 10m)	16ft-4in x 24ft-7in. (5.0m x 7.5m)
Working pressure range	10 - 30 psi (0.7 - 2.1 bar)	7 - 30 psi (0.5 - 2.1 bar)
Laboratory certification	UL, C-UL	
Nozzle design	Specialised open nozzle for use in tunnel deluge fire protection systems	
Technical datasheet reference	TFP 852	TFP 850

World-class components



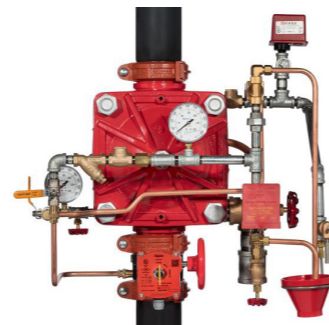
Valve Cabinets

- Pre-assembled, pre-tested and pre-wired for plug and play convenience that reduces install time and labour.
- Customised cabinets with the required options are available for tunnel applications.



TN-17 / TN-25 Open Nozzles

- Application-specific design.
- Lower material and installation costs.
- Designed to meet requirements for minimised water use while maximising coverage area.



Deluge Valves

- Compact and versatile pre-trimmed configuration.
- Low installation and operational costs.
- Activation and quick reset from single or multiple remote locations.
- Wide-ranging configurations and applications.
- Broad variety of sizes.



Grinnell G-Fire Piping Solutions
The perfect piping product can be supplied according to local specifications and standards.

Using Grinnell G-Fire couplings to join pipes provides quick installation, easy ongoing system maintenance, and significant cost savings when compared to traditional pipe-joining methods such as welded and flanged pipe joining.

Listings and Approvals:
UL, C-UL, LPCB, VdS, FM



Grooved Butterfly Valve

- Visual indication of valve open/closed position.
- Cut groove inlet and outlet connections.
- Suitable for use with grooved pipe couplings that are listed or approved for fire protection service.
- Rated for use at a maximum pressure of 300 psi (20.7 bar) or 175 psi (12.0 bar) for the 10-inch model.



Grinnell G-Fire Grooved Rigid Coupling

- Proven method of joining pipe that provides a rigid joint by firmly gripping along the full circumference of the pipe groove.
- Economical alternative to welding, threading or using flanges.
- Rated at pressures up to 350 psi (24.1 bar) depending on pipe size and wall thickness.
- Available in stainless steel.



Resilient fire detection Effective fire suppression

From detection to suppression, our technologically advanced tunnel fire protection solutions have been tested and approved to industry standards for efficient, effective protection every time.

Detection

The ZETTLER brand from Johnson Controls provides world-class fire detection systems built on MZX Technology platforms.

The ZETTLER SensorLaserPlus™ is designed to be used in areas that are hard or impossible to access after installation, e.g. false floors, since maintenance and troubleshooting can be carried out from the control unit.



The fibre optic sensor cable is designed to be maintenance-free. Thanks to its particularly robust characteristics, it offers a high level of security against false alarms. The sensor cable is designed to be impervious to dust, dirt, moisture, high temperatures, pressure and the action of vibration and wind as well as corrosive atmospheres. The purely passive optical analysis process is intended to make the ZETTLER SensorLaserPlus™ immune to interference fields – such as tunnel radio, mobile radio or ventilators – as well as offering total resistance to dirt and corrosive gases.

Various system components

In addition to delivering all the components needed for a fixed tunnel fire protection system we also provide:

- foam and foam hardware
- engineered systems
- other nozzles or sprinklers

Selected sprinklers, nozzles and valves are now available in a variety of special materials, such as stainless steel and titanium.

For more information please see datasheets: TFP850, TFP852 or visit www.tyco-fire.com

About Johnson Controls

At Johnson Controls, we transform the environments where people live, work, learn and play. From optimizing building performance to improving safety and enhancing comfort, we drive the outcomes that matter most. We deliver our promise in industries such as healthcare, education, data centers, and manufacturing. With a global team of over 100,000 experts in more than 150 countries and over 130 years of innovation experience, we are the power behind our customers' mission. Our leading portfolio of building technology and solutions includes some of the most trusted names in the industry, such as Tyco®, YORK®, Metasys®, Ruskin®, Titus®, Frick®, PENN®, Sabroe®, Simplex® and Grinnell®.

For more information, visit www.johnsoncontrols.com or follow [@johnsoncontrols](https://twitter.com/johnsoncontrols) on Twitter.



ZETTLER



North America

1400 Pennbrook Parkway,
Lansdale, PA, 19446, USA
+1 215-362-0700
+1 800-558-5236
www.tyco-fire.com

Europe

Kopersteden 1,
Enschede,
Overijssel, 7547 TJ
The Netherlands
+31 (0) 53 428 4444

Middle East

Internet City, Office Park
Building, Block D, Floor 3
Dubai
United Arab Emirates
+971 4455 0700

Asia Pacific

2 Serangoon North,
Avenue 5,
#07-01, 554911,
Singapore
+65 6577 4360

The power behind **your mission**

