

Fiber Optic Tunnel Protection Guide

Imagine thousands of detection points with the installation of a single cable.

Tunnel installations include conditions with dirt, dust, moisture and corrosive environments. Conventional technology often fails to provide a reliable and cost-effective protection solution. Forced by conditions, conventional detectors tend to result in false alarms and often lead to significant disbursements in maintenance. The F.O. TASC Linear Sensing System is designed to minimize operating costs and to operate with maximum reliability even under adverse conditions such as:

- Dirty, dusty and corrosive environments.
- High humidity and dynamic temperature fluctuations.
- Solvent vapours and radioactive radiation.
- ATEX classified areas with gas or dust.

Fiber Optic cable technology is long-lasting and maintenance-free.

The most dangerous incident that can occur in a tunnel is a FIRE. Due to the fuel of the vehicles that circulate through the tunnels and / or transport of dangerous goods, the possible fires that would be generated in a tunnel would be of great caloric power. In addition to this, it would be necessary to count on the great presence of toxic gases, poor visibility due to smoke, disorientation of users, emergency exits difficult to locate and the so-called "oven effect".

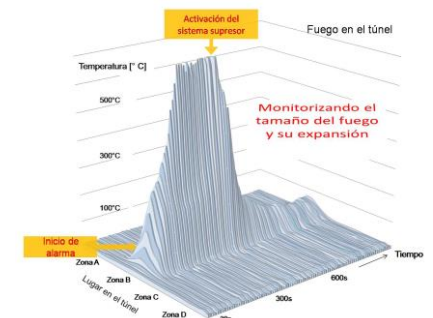
FIRE SURVEILLANCE, NOT JUST DETECTION

For the reasons stated above, fire prevention in a tunnel is critical.

TASC's Linear Fiber Optic Heat Sensing System leaves no zone unguarded and displays real-time temperature development and heat distribution of the entire zone at once.

The possibilities of the TASC Linear Detection System go far beyond conventional fire detection systems. The system is not only to quickly detect the different types of fire, but also to locate them accurately in a few meters, without affecting the wind, and control the size of the fire and propagation for an extended period of time. No other fire detection system is able to withstand **temperatures up to 1000°C**, without losing surveillance capability – which makes the difference for controlling appropriate measures effectively.

As can be seen in the figure, the system is not only able to maintain vigilance for the duration of the fire, but once the extinguishing measures are activated it is able to tell us when the optimal temperature is reached in order to enter the tunnel.



This facilitates the entry of emergency means and the evacuation of trapped people.

Knowing the direction of the fire, the fume extraction system can also be activated more effectively.

In addition, the system is immune to electromagnetic interference, dirt, dust and moisture. Even in the event of a cable outage, the system continues with its surveillance.



FLEXIBILITY

TASC's Linear Fiber Optic Detection System (DTS) is the most flexible and adaptable on the market for different tunnel configurations, due to the wide variety of control units and cable monitoring capability of tunnels.

With TASC DTS we can perform different architectures of the protection system:

- Single Ended



- Dual Ended - Cable redundancy



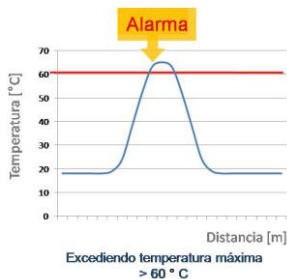
- Total redundancy



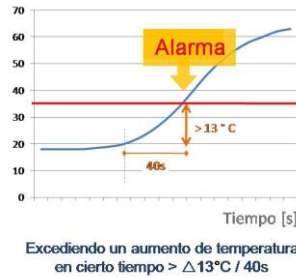
Depending on the customer's request and the reliability you want to bring to the system.

Different sensitivities can be programmed to cover different temperature conditions throughout the cable length. Up to 256 zones can be programmed per channel with up to 5 alarm criteria:

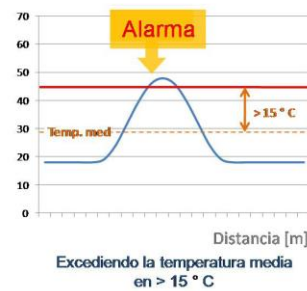
- Maximum alarm



- 3 Temperature differentials



- Difference in average temperature in the area



Easy integration

The system can be easily integrated with a management platform (e.g. SCADA systems), either directly by communication over Ethernet (TCP/IP) using SCPI (Standard Programmable Commands Interface), or Modbus RS 232, RS 422, RS 485 and TCP/IP.

It also comes standard with 44 fully programmable relay outputs, expandable up to 256 per channel by expander modules.

All this makes the DTS system able to interact with the rest of the security and evacuation systems of the tunnel, achieving greater prevention and protection.

Types of cable and installation thereof

For tunneling there are two types of cables:



One with aramid fiber protection and one with protection from a steel thread crown.

The cover of both is halogen-free and flame retardant. Both are approved according to IEC60331-25 which certifies that they maintain their physical integrity at a temperature of 750°C for 2 hours and 1,000°C for several minutes.

There are a lot of accessories for the installation of the cable that is usually made in the tunnel key.



With the same cable, galleries of installations and tunnel evacuation routes could also be protected.

REGULATIONS

TASC's DTS system complies with the main approvals in fire detection systems:

- EN54-Part 22, by VdS.
- UL521.
- ULC S530.
- FM GLOBAL.
- ATEX.

In addition, it is the only system in its category that is SIL2 certified and has a declared MTBF of 33 years.

Depending on the regulations to be applied, the distance from the sensor element (cable) to the different walls or walls and between cables may vary.

For any questions or clarification about this guide and request for prices and references, you can contact us at the following email addresses:

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