

CABLE TUNNELS AND CABLE TRAYS – LINEAR HEAT DETECTION USING DTS TECHNOLOGY

Firelaser distributed temperature sensing (DTS) technology has been extensively used as an effective linear heat detection system to protect cable trays and cable tunnels. These are two distinct applications within this environment.

Fires in cable tunnels are not frequent events but such events can have a significant financial impact on the owner companies due to the business related critical data and services that these critical “arteries” may provide. Fires in such environments, if not detected quickly, can pose a significant danger to the owner companies in terms of protection of personnel and the company assets.



Example of cable utility tunnel containing power and gas lines

The main fire risks associated with cable tunnel and cable trays are due to:

- › Faulty electrical cables within the cable trays
- › Faulty electrical equipment used to control the tunnel environment
- › Associated hot works which may routinely be carried out
- › Build up of flammable materials discarded by personnel

High intensity fires can produce significant quantities of toxic smoke and fumes which may hinder the escape of trapped personnel and the ability for fire and rescue services to gain access to extinguish the fire. It is therefore important to be able to determine the location of the origin of the fire event in an effective and efficient manner.

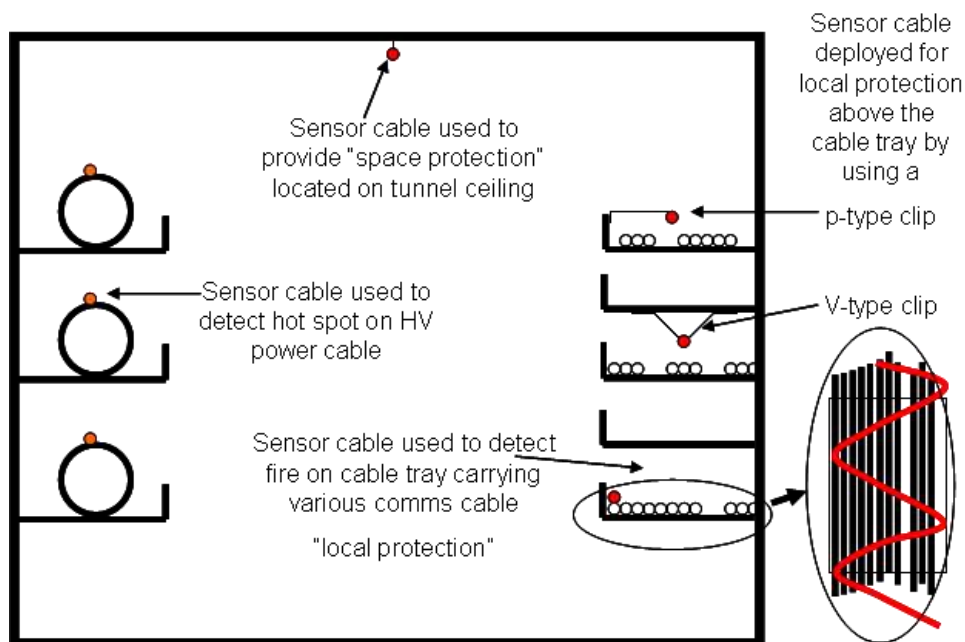
The use of fiber optic linear heat detection within such an environment is a viable option to providing an efficient and provides the following advantages:

- › Ability to of detect the precise location of the origin of fire events (to within 1m)
- › Provides a cost effective and low-cost-of-ownership solution, by virtue of the long distances that are protected and totally passive and effectively maintenance free sensing cable
- › Immune to RFI and electromagnetic interference
- › Firelaser DTS system continuously produces temperature profiles of the cable tunnels and trays, and this data may be used to control the tunnel ventilation system and is essential to normal and emergency operating conditions

The minimum level of protection is achieved by locating the sensing cable at the tunnel ceiling, its position defined by the structure of the ceiling, but generally under a flat ceiling, the sensor cable can be located in the centre of the ceiling, at a distance of 25mm to 150mm from the ceiling surface. A suitable cable fixing method should be adopted, using the recommended cable fixing distances, generally 1.5m apart. This type of application is a so called “room protection” application (see approvals), where the sensor cable is located at a distance away from the main fire risk. “

Additional protection may be provided by “local protection”. The sensing cable is located in close proximity to the cables in the cable trays, thereby providing “local” fire protection (see approvals).

For local protection applications on cable trays, the figure below illustrates a few different techniques for deploying the fiber in close proximity to the cables in the tray using p-clips and V-clips.



Escalator Fire Detection System Zones

In addition an alternative method is to lay the cable in a “sinusoidal” style on top of the cables in the tray. For High Voltage (HV) and Medium Voltage (MV) power cables, there is often a requirement to monitor for cable hot spots that can be localized at locations at any point along the cable route. In such cases a sensing cable can be located on the outside of the power cable, in constant contact with the HV/MV cable surface. The above figure also illustrates the typical location of the sensing cable positioned for “space protection”.

Firelaser’s unique fire detection zoning techniques allow for a large number of detection zones to be configured to allow for easy location of the fire alarm event. Additional alarm rip levels can be configured for each zone, and as an example different pre-alarm levels can be set for individual cable tray risks. The cable is not subject to interference from high level electromagnetic fields, which are often found within such an asset. The system can effectively be used as an early fire alarm detection method and be interfaced to an appropriate Fire Alarm Control Panel (FACP) or Agent Release Panel (ARP).



DTS linear heat detection system seamlessly integrates with fire control panel

Approvals

The system is approved to EN54 part 22, heat classification BN, which is a fire detection product standard classification, which uniquely stipulates a specific test criteria for this “local” application (refer to EN54 part 22 para 3.1.7). The heat classification BN, indicates a normally operating temperature within the local environment of between 40C to 65C, and the alarm activation temperature between 69C to 85C.

“Room Protection” is defined within EN54 part 22 para 3.1.12. The heat classification A1N indicates a normal operating temperature within the local environment of between 25C to 50C, and the alarm activation temperature between 54C and 65C.

About Kifta Technologies

Kifta has been providing advanced fiber optic monitoring sensors and integrated technologies since 2015. Our knowledge regarding the application of distributed temperature sensing technology within the fire industry is second to none. We focus on the safe integration of Firelaser DTS technologies into client’s proprietary systems and provide exceptional systems design support, product support during installation and provide long term maintenance packages.

For further information and system design support please contact our global team at kiftatechnologies.com