

ESCALATOR FIRE DETECTION USING DISTRIBUTED TEMPERATURE SENSING

Escalators form a vital means for the convenient movement of people to and from large complex buildings. As such, escalators can form an integral part of the escape strategy, when a building is in a state of emergency. It is not the purpose of this application note to define whether an escalator should be used for the purpose of evacuation of personnel from a building in an emergency but rather demonstrate the usefulness of utilizing distributed temperature sensing monitoring systems as a linear heat detection system for escalator fire detection.



There are many factors to consider when instigating a process of the possible adoption of escalators for emergency evacuation for fire and certain non-fire incidents, such as Imminent Catastrophic Events (ICE). It is vital that the escalators and associated emergency egress routes are available at all times for their safe usage.

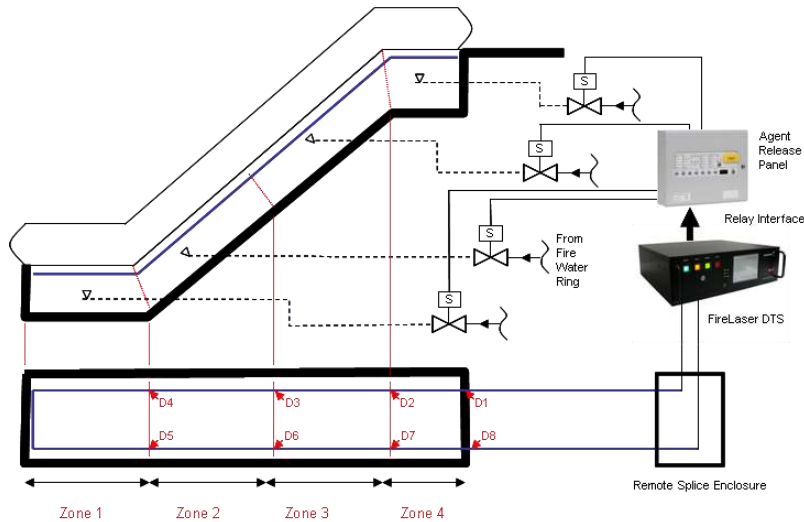
In light of the above, the main fire risks associated with escalators are due to:

- › Faulty electrical equipment used to control the escalator movement and direction
- › Roller bearings failure over time, which may lead to local overheating
- › Associated hot works which may routinely be carried out in close proximity to the escalator
- › Build up of flammable materials discarded by personnel

Bandweaver's solution to this problem is to deploy a FireLaser distributed temperature sensor control unit to provide heat detection in close proximity to the escalator, or indeed a number of escalators. The sensing cable is located in close proximity within the escalator, thereby providing "local" fire protection.



The figure below illustrates an example layout of the fiber optic sensing cable where the escalator is divided into a number of detection zones. In reality, the number of zones will vary from installation to installation and be dependent upon escalator length, defined risk and the associated fire mitigation strategy.



Escalator Fire Detection System Zones

In this example the sensor control unit is programmed with multiple detection zones, along the length of the escalator and including the “end zones”. These areas at either end of the escalator are typically higher risk as they are often the site for electrical equipment and are often the areas most prone to collecting discarded materials. Generally, each detection zone has an associated output relay, which is turn connected to the main Fire Alarm Control Panel FACP. In installations where an associated deluge system is deployed, the relay contacts may be connected to an Agent Release Panel. The diagram illustrates how an Agent Release Panel may be configured to activate a zonal based deluge release system into four separate fire detection/deluge release zones.

The sensor cable (shown in blue) is installed between the local Remote Splice Enclosure, located closely to the escalator in question. Individual lengths of the sensor cable can be configured to be included within separate fire detection zones:

- Zone 1 = D4 to D5
- Zone 2 = D3 to D4 plus D5 to D6
- Zone 3 = D2 to D3 plus D6 to D7
- Zone 4 = D1 to D2 plus D7 to D8

D1 to D8 equate to distance measurements from the FireLaser distributed temperature sensing solution, when viewed on the temperature profile as indicated in Figure 2. Temperature profiles are rapidly and continuously calculated by the FireLaser distributed temperature sensor system, and the sensor control unit determines if there is an alarm decision. The system continuously monitors for background fault type events. Alarm signals are communicated to the Fire Alarm Control Panel or Agent Release Panel via relay contacts. Sensor cable which is not contained within the local asset to be monitored is effectively programmed to not give alarm thus rendering this “transit cable” as non-reacting.

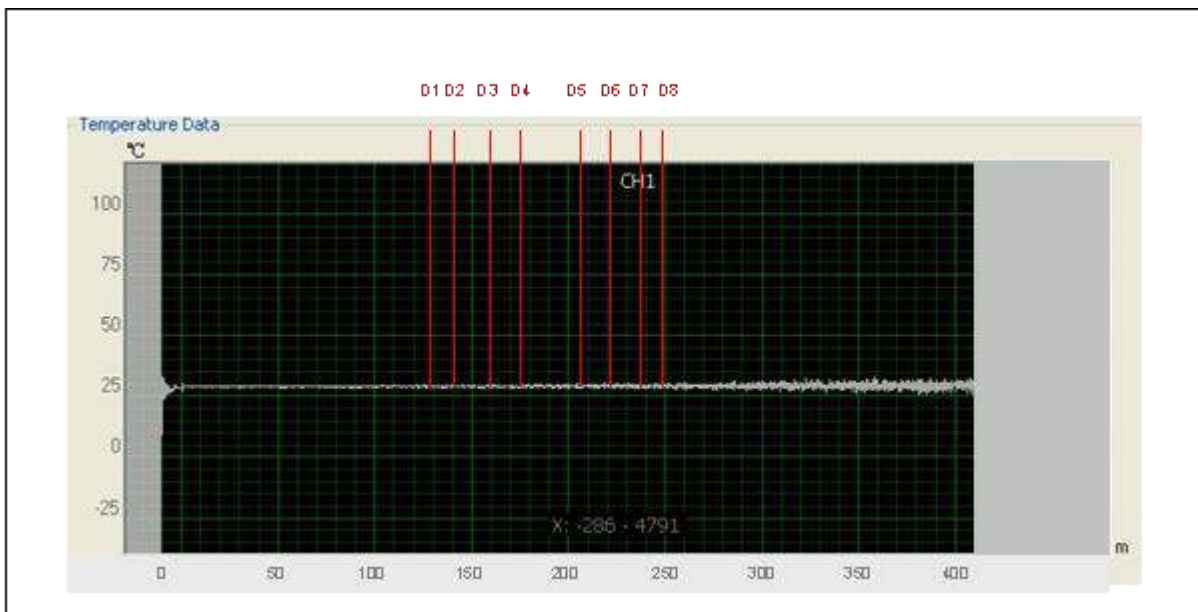


Figure 2 Temperature Profile Indicating Zone Boundaries



Approvals

The DTS 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.



About Bandweaver Technologies

Bandweaver has been providing advanced fiber optic monitoring sensors and integrated technologies since 2002. 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 clients 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 www.bandweaver.com