SECURITON

Escalators and Travelators

SecuriHeat d-LIST

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1 Introduction

The first escalator was installed in New York City in 1893. It elevated passengers on a conveyor belt at a 25-degree angle and travelled only a little over 2 m (7 ft) – indeed, it was more like an inclined travelator. Since then, both escalators and travelators have evolved and grown as planners and architects understood their capacity for moving large numbers of people comfortably and efficiently. The longest escalator system in the world, the Central Mid-Level escalator system in Hong Kong, boasts an elevation of roughly 135 m (443 ft.) and a distance of more than 800 m (2,425 ft). The longest moving walkway in a city is 207 m (679 ft) long, located underneath the parks and gardens of The Domain area in Sydney, Australia.

Throughout their history, but especially now, safety has been a key consideration for escalators and travelators. Because of the similarities between the two, safety codes and standards in many countries are designed to cover both. One of the oldest Safety Codes for Elevators and Escalators, first published in 1921, evolved to be known as ASME A17.1/CSA B44 [1] and A17.7/CSA B44.7 [2]. Nowadays many codes, such as EN 115-1 [3] or AS1735.12 [4], codify health and safety regulations for escalators and travelators. These codes generally outline the requirements that are associated with construction and design, installation, testing, inspection, maintenance and ongoing operation.

Escalators and travelators are commonly used as part of the egress route, and a fire incident starting from these areas can present both technological and behavioural challenges when not detected early. For example, how should they be managed when a fire or smoke incident is detected, in order to avoid a potential stampede and ensure tenable conditions for the egress routes. Other challenges such as the ongoing service and maintenance of such fire detection systems must also be taken into account, given the potential need for continuous business operation.

Reliable fire detection is a critical part of best practices of a fire engineering solution to address these challenges. This is particularly relevant as far as safe evacuation of very large numbers of building occupants is concerned. A well-designed and reliable detection system provides risk mitigation to potentially prevent a fire from happening or developing out of control before an orderly evacuation can be put in motion. A staged alert and alarm can also facilitate fire service response well before the situation develops into a life-threatening situation. Properly designed, the fire detection system can also be used to operate a smoke management system and actuate pre-action and co-incidence (or ‘interlock, double interlock’) suppression systems.

Securiton’s SecuriHeat d-LIST resettable line-type heat detector (LTHD) offers a robust, reliable and quick-acting fire detection system well suited for all types of harsh industrial and challenging environments. SecuriHeat d-LIST is an electronic sensor cable system that has been specially designed for EN 54-22 [5] and offers precise localisation of a heat incident. Other key advantages include its relatively high sensitivity, and the fact that it is free of routine maintenance, fully water resistant, discreet and easy to install.

The purpose of this Case Study is to provide fire safety and protection consultants, qualified fire system specifiers, design engineers or technicians, with recommendations for the application and use of SecuriHeat d-LIST LTHD detectors to protect escalators and travelators of varying size and design. A key design objective is to enhance fire detection methods to avoid business interruption and mitigate risks through best fire prevention practices.

Where applicable, the Case Study also provides key requirements on Inspection, Testing and Maintenance (ITM).

2 Aspects of fire safety and prevention

Escalators and travelators are essential building components which enhance building occupants’ mobility, comfort and movement efficiency. They move large amounts of people at once and are extremely efficient for moving people across vertical heights. They are often found in large public structures such as shopping malls, railway and other rapid transit hubs, airports and exhibition centres. Increasingly, outdoor combined escalators and travelators help overcome challenges in multi-level movement of large numbers of people in hilly urban areas.

The reliable operation of escalators and travelators is critical to general fire safety and hazard risk management in the public buildings they serve, where evacuating large numbers of occupants is of critical importance. A fire detection system that is reliable in all ambient conditions is critical to ensuring the time required to evacuate people before untenable conditions arise, and the continued monitoring of conditions within egress routes to safety. Many of these built environments must be in optimal operational condition 24/7 without interruption. A fire incident, including a mass evacuation due to a false alarm, can lead to significant interruption to operation, business losses and undesirable customers’ experience.

When escalators and travelators are designed within a specific building occupancy, for example large sport stadia or mix-use transportation hubs, building and life safety codes such as NFPA 101 [6], NFPA 5000 [7] and the International Building Code [8] often reference and mandate the use of the A17.1 Expert Consensus Code on Escalators and Travelators. Other codes, such as ABCB (Australia) Lifts Used During Evacuation [9] and BRE (UK) Emergency use of Elevators, Escalators and Travelators for Evacuation [10] provide further details on the use of these building systems in the event of an emergency evacuation. In the context of building and life safety, the design principle of average waiting time and handling capacity for escalators and travelators is no longer just a comfort factor of the occupants and efficiency for business operation. It is a defining factor in how early a fire or smoke incident must be detected to allow for an orderly evacuation.

2.1 Escalators and Travelators

Both escalators and travelators are used to transport people in public spaces. The main difference is that an escalator, sometimes referred to as a ‘moving staircase’, moves people vertically between different floors of a building, while a travelator, also known as a moving walkway, moves people horizontally or on a slight incline over short to medium distances, along a flat continuous surface to walk on.

The longest (outdoor) escalator system in the world, the Central Mid-Level escalator system in Hong Kong, boasts an elevation of roughly 135 m (443 ft) and a distance of more than 800 m (2,425 ft). The longest continuous single escalators are the three identical escalators located at separate metro stations on the St. Petersburg Metro, measured at 138 m (453 ft) long, 69 m (226 ft) high.

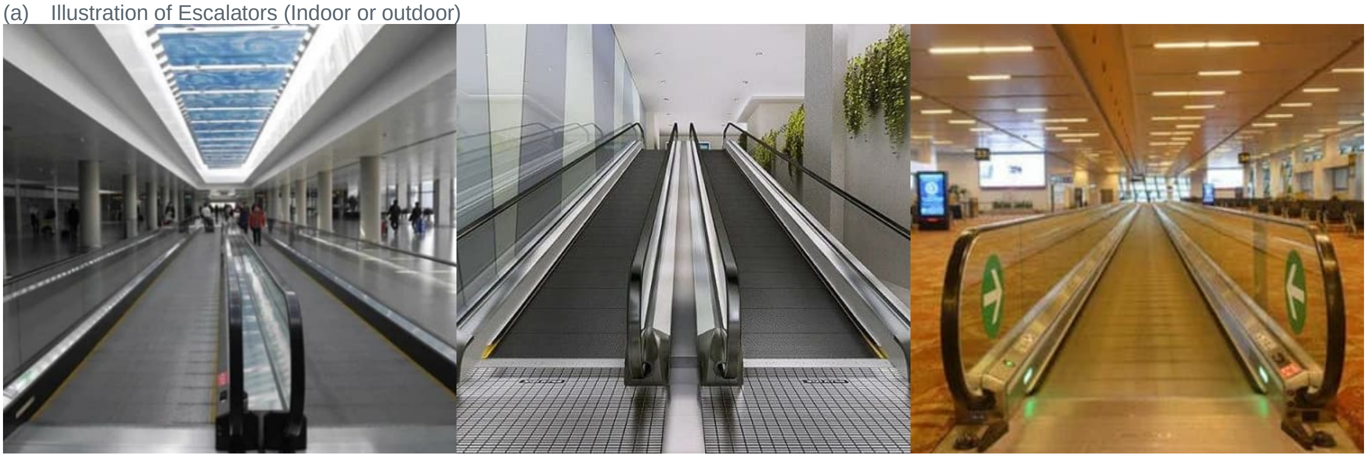
Travelators are typically associated with airports, but the longest moving walkway in a city is 207 m (679 ft) long, located underneath the parks and gardens of The Domain area in Sydney, Australia. The walkway is gently inclined and moves at 2.4 km/h (1.5 mi/h), taking just over 5 minutes to complete one length.

Depending on their specific requirements, escalators and travelators come in various configurations and are used in various indoor and outdoor operational conditions: For the purpose of this Case Study, the following examples are used to illustrate typical escalators and travelators, as shown in Figure 1:

(a) Escalators (indoor or outdoor). Escalators are continuously circulating motorized stairways that move people between floors of a building. They can be simply from one level to another, or multiple levels continuously across a transverse distance.

(b) Travelators (horizontal or inclined). Single or double travelators also known as ‘moving walkways’, ‘autowalks’, or ‘moving sidewalks’, are slow conveyor belts or chains that transport people over short to medium distances horizontally or on an incline.

(a) Illustration of Escalators (Indoor or outdoor)



(b) Illustration of travelators (single or double, horizontal or inclined)

Figure 1 Escalators and travelators

From a fire risk perspective, key risk areas for escalators and travelators include the drive system - the mechanism that provides power and drives the moving steps or platforms. It typically consists of a motor, gearbox, drive chain, and sprockets, and is located at the top or bottom of the escalator. The motor converts electrical energy into mechanical energy, which is transmitted to the gearbox through the drive chain. The gearbox, in turn, controls the speed and torque of the escalator/travelator, ensuring that it operates smoothly and efficiently. The sprockets and drive chain transmit the power from the motor to the steps or platforms, causing them to move. The drive system is usually placed in a machine compartment at one end or the other of the travelator or escalator and is typically accessible through a door or hatch for easy maintenance and inspection. Figure 2 below illustrates these components within an escalator.

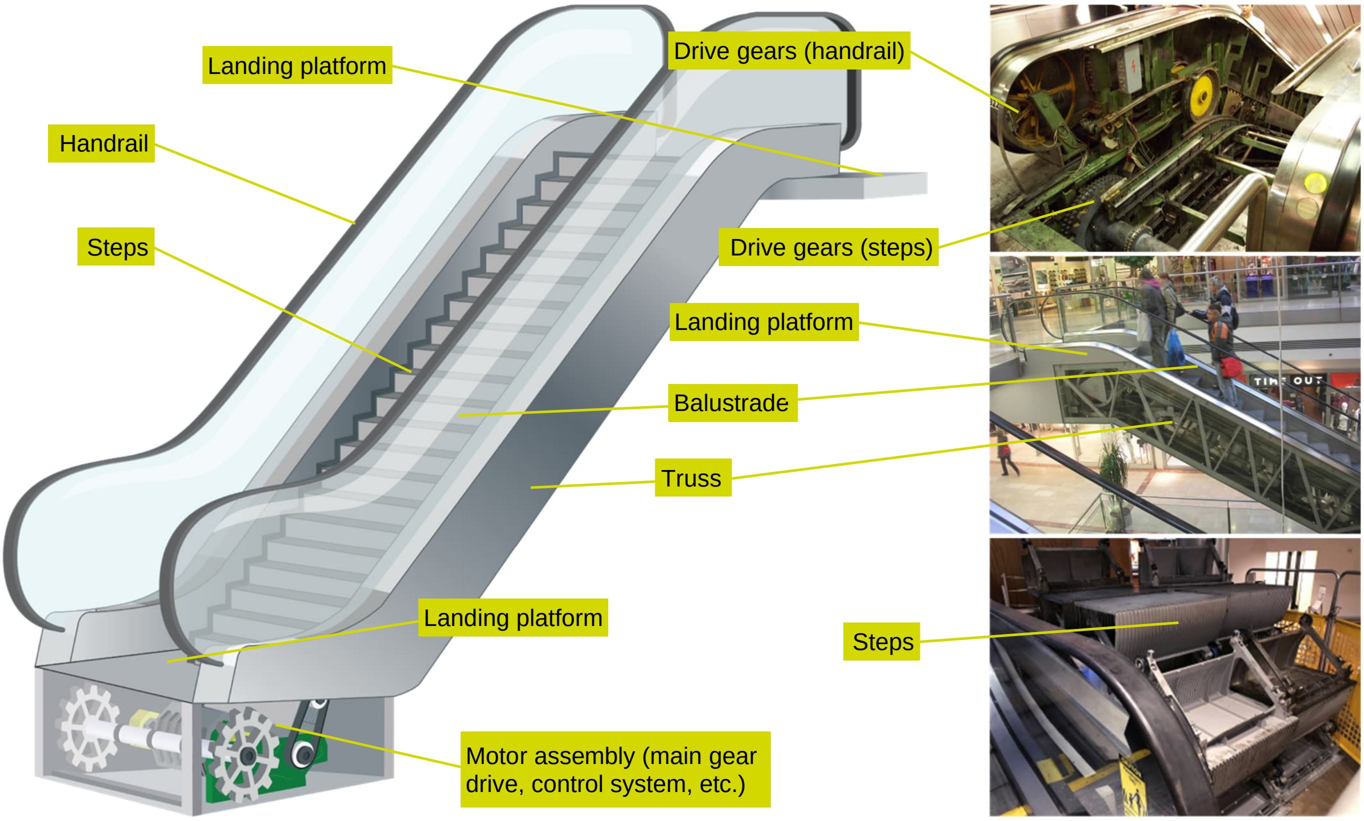


Figure 2 Machine and mechanical components of an escalator

2.2 Fire risk, consequence and safety

Escalators and travelators often form part of the egress routes, particularly in places such as underground stations and railway platforms where routes and passageways to safety above are often limited. However, potential fire risks from the escalators and travelators themselves are real, due to the constant moving of mechanical parts with oily dirt build-up over time and potential motor overheating that can lead to a smoke and fire event. Although the overall risk of fatality from such a fire is low in these environments, the key risk management strategy is to firstly ensure moving escalators and travelators can stop gradually as soon as a fire incident is detected, and secondly to avoid crowd panic and stampede. A potential fire or smoke incident resulting from overheating underneath an escalator or travelator may not be immediately deadly but can lead to panicking if not detected and managed early. A fire not detected early in relatively confined spaces, such as a walkway tunnel, can render routes of egress untenable rapidly, thus pose a threat to life safety.

Apart from building and life safety codes and standards, quantitative requirements of egress paths and time to safe evacuation are required in large and often mix-use occupancies such as underground metro stations and rapid transit hubs. NFPA 130 [11] for example, stipulates the maximum time allowed to evacuate a platform (e.g. 4 min) and then to a point of safety (e.g. 6 min). The required safety evacuation time is calculated based on egress route options, air ventilation operation and escalator movement control against maximum travel distance to an exit from a platform with a designated occupancy load.

The London King's Cross underground fire on November 18, 1987, is one of the worst fires started from underneath an escalator: it killed 31 people and injured 100. Although not usually as deadly, small fire or smoke incidents involving escalators and travelators are not uncommon. Furthermore, false alarms from fire detectors are unwanted in these unique protected areas as they can present risks to life safety from panicking. The main fire hazards and risks are:

- Faults in high-current electrical equipment with large amounts of equipment and cabling installed in compact spaces or concealed areas
- Presence of combustible materials with lint/dust, debris, grease and oil build-up within their mechanical structure
- Spark ignition from motors or overheating from mechanical equipment failure can lead to friction fires
- Fuel load includes construction materials such as wires, electronic components, lubricating oil and rubber wheel, this can lead to rapid fire growth
- Unnoticed incipient fires in enclosed spaces increase the risk of a much-delayed emergency evacuation. In the case of escalators and travelators, such a risk of delayed detection can lead to life threatening situations, in particular when egress routes become untenable for evacuation.

3 Challenges to reliable fire detection

Statistically, the collective risks to operation interruption, property damage and life loss due to fire incidents remains a real threat across large public gathering places such as transit hubs, airports, sports stadia, office buildings and shopping malls. Providing reliable detection of fire in and around escalators and travelators is critically important. However, the reliability and effectiveness of such fire detection faces challenges in the environmental conditions within the protected space:

- Dust, lint, oil grease build-up over time and vapours from abrasive wear
- Irregular airflow pattern from piston effect in pressurised underground metro platforms or turbulent flow under escalators and travelators with fast moving air circulation
- Escalators and travelators can be indoor, semi outdoor or completely outdoor, hence exposed to a wide range of temperature and change of other ambient conditions
- Hot smoke from a building fire propagating into concealed spaces underneath escalators and travelators can become a source of ignition
- Actuation of other building or fire protection systems, such as a smoke management or fire suppression systems, depend on a timely and reliable detection to be effective

Additionally, unnecessary operation interruptions to escalators and travelators are undesirable and must be avoided. The frequency of the maintenance regime and the need to access a fire detection system are also important considerations. On the other hand, non-intrusive access and low maintenance requirements of a fire detection system can keep TCO[1] low.

Escalators and travelators come in various sizes and are installed in different configurations. Wider choices of fire detection system variants can ensure that both design and cost of the fire detection system are optimised while consistent detection performance is achieved.

Codes and standards may not prescribe exactly how a fire detection system for escalators and travelators is designed. Performance-based design (PBD) can be applied to assess life and building safety. In PBD, fire detection performance needs to be quantified, from alert, alarm and initiating evacuation procedures to the control of other building systems and actuation of suppression systems. Specific yet flexible fire detection system design should be applied to allow for dependable detection at the right level of sensitivity. In this context, how to quantify a fire detection system remains a challenge.

A further challenge is that false alarms, when not verified, will not only interrupt large assembly buildings' operation, inconvenience the public and slow down productivity, but also potentially lead to unwarranted emergency evacuation. For example, up to 62% of calls to emergency services from transit systems in London are false alarms [12]. Any operation interruption due to a real fire event, false or nuisance alarms could present risks to life safety as well as leading to an unacceptable extended service downtime to passengers and direct and consequential losses in revenue and productivity as a whole.

Challenge	Securiton advantages
Smoke and heat dispersion due to high and turbulent airflow, or semi-outdoor and outdoor environments	Use of SecuriHeat d-LIST for heat detection, integrated with sprinkler actuation where applicable. A relatively long length of sensor cables (2 x 350 m (1’148 ft)) can be monitored by a single main detector unit, which can be positioned further away still. It has the sensitivity and flexibility to react to relatively small fires even in an open area.
Wide ambient temperature range	SecuriHeat d-LIST operating temperature range: ▪ main detector unit -25°C to +70°C (-13°F to +158°F) ▪ sensing cable -40°C to +85°C (-40°F to +185°F) Reinforced cable with strain relief and aluminium foil shielding.
Practical design considerations (including challenging ambient conditions)	Small cable diameter and small minimum bending radius with flexible junction box connection for easy install, troubleshooting and services. SecuriHeat d-LIST offers two levels of alert and alarm per detection zone. This facilitates earlier incident alert to tackle potential fires and minimise damage and disruption. Fire alarm can be integrated with pre-action sprinklers for timely fire suppression and fire services notification.

[1] Total Cost of Ownership

Challenge	Securiton advantages
Risk-based detection	SecuriHeat d-LIST works with individual high precision temperature sensors embedded in tough cable for pinpoint monitoring where specific addressable detection and alarm are needed.
Obstructed or difficult access	SecuriHeat d-LIST sensor cables are located underneath or routed around where escalators and travelators are installed, while the main control unit can be installed remotely inside or outside the building. Routine service and testing are done from the main control unit.
False alarms	SecuriHeat d-LIST uses unique highly sensitive rate-of-rise detection combined with fixed threshold alarm for maximum reliability.
Low TCO with minimal ongoing services and maintenance	Easy to clean, including with pressure washers and many common chemicals. The whole detection system, including the sensor cables, requires no or minimal routine maintenance No drift (no re-calibration) Performs self-test (no maintenance test) No limits to cuts & repairs, with no loss of performance

Table 1 Challenges to and solutions for Escalators and travelators protection with reliable fire detection

SecuriHeat d-LIST is an ideal solution to address the key challenges of ensuring a reliable fire detection for escalators and travelators (see Table 1 above). It is an electronic sensor cable system that has been specially designed for EN 54-22 [5] and offers precise localisation of an incident. Other key advantages include its relatively high sensitivity; its real-time system fault self-check and alarm; and the fact that it is free of routine maintenance, fully weather resistant, discreet and easy to install.

4 Optimised design & Use Case

When protecting a key machine or production line asset, specific risks must be taken into account together with the challenges of the operating environment. This chapter provides details of optimised SecuriHeat d-LIST design and use case as follows:

1 Design criteria
2 Application scenarios
3 General building protection
4 Integrated verify, control and respond
5 Benefits and system considerations

4.1 Design codes of practices

According to general codes and standards, large infrastructure or public assembly buildings such as shopping malls and airports, must comply with life and building safety provisions (e.g., NFPA 1 [13], NFPA 101 [6] and NFPA 5000 [7]) as prescribed per international and local codes in accordance with relevant building occupancy classification or property uses. Although prescriptive building and life safety codes stipulate the need for fire detection in addition to other fire safety measures in a building, these requirements may allow for enhancements or refinements on the basis of a proper risk management assessment and operational characteristics of the building use at the time of the assessment.

The risk assessment and design considerations require fire engineering professionals to work within the prescriptive constraints of the applicable building codes while applying the best engineering practices to address public assembly building occupancy specific needs[2]. In particular the risks, the requirements for uninterrupted business operation and the critical need for reliable detection of a fire originating from escalators and travelators, shall be adequately addressed. In this regard, Performance-based Design (PBD) together with a risk-based approach (e.g., NFPA 551 [14], ISO 16732-1 [15]) to the optimisation of fire detection to supplement prescriptive baseline design is the key to meeting the requirements of building and life safety.

[2] Each country or state/province may have its own (or adopted) building and fire code or directives. Examples are the Muster-Verwaltungsvorschrift Technische Baubestimmungen (MVV TB) in Germany, The Regulatory Reform (Fire Safety) Order 2005 in the UK and National Building Code of India 2016.

Performance-based Design (PBD) is typically implemented when elements of fire safety and protection system design are not covered in prescriptive codes. This may be due to unique building structure, environmental conditions, or the need for added detection for early fire alert or extended egress considerations [16]. For escalators and travelators inside a large public gathering complex, a PBD approach is commonly adopted for either of the following:

- As a means to determine equivalency to a prescriptive code or standard
- As an approach to achieve broadly defined fire safety goals and objectives

An adequate fire detection system that detects and alerts early allows trained staff or an on-site emergency response team to control the initial outbreak before it gets out of hand. Early detection of a fire also prevents avoidable business interruption and facilitates orderly and safe evacuation as the fire evolves. When a suitable fire detection system can be designed and installed at a low TCO[3], the system can achieve protection of business operation objectives as well as life safety.

Table 2 illustrates how LTHD Fire Detection system performance, as well as other design parameters such as environmental conditions and typical applications, are defined. Note that although the design of SecuriHeat d-LIST in this Case Study is in the context of PBD and is likely accompanied by a more general fire detection system that meets statutory requirements, response classes, environment groups, temperature classes and range of spacing options are applicable as design references.

Design Parameters	BS/EN 54-22 [17][4]		NFPA 72 [18]	
Class vs. Detection Range	**Response Class**	**Detection Range °C (°F)**	**Temperature Class**	**Response Temperature °C (°F)**
	A1	54 - 65 (129 - 149)	Low	38 - 57 (100 - 135)
	A2	54 - 70 (129 - 158)	Ordinary	58 - 79 (136 - 174)
	B	69 - 85 (156 - 185)	Intermediate	80 - 121 (176 - 250)
	C	84 - 100 (183 - 212)		
	D	99 - 115 (210 - 239)		
	E	114 - 130 (237 - 266)		
	F	129 - 145 (264 - 293)		
	G	144 - 160 (291 - 320)		
Environment Group	**Environment Group**	**Temperature Range °C (°F)**	n/a	
	(E)1	-5 to +40 (+23 to +104)		
	(E)2	-10 to +55 (+14 to +131)		
	(E)3	-25 to +70 (-13 to +158)		
Typical Applications and Boundary Conditions	E1: Indoor; Stable and Clean Conditions; Commercial and industrial E2: Indoor; Varying and polluted environment; Commercial and industrial E3: Outdoor; Harsh conditions			

Table 2 Design and performance parameters for LTHD per codes and standards

4.2 Design criteria: SecuriHeat d-LIST

This chapter describes design criteria using SecuriHeat d-LIST products to protect escalators and travelators. SecuriHeat detects temperature changes and alerts and alarms almost instantly to any potential fire incident or developing fire event. The d-LIST sensor cables (SEC15) are sealed systems that are immune to dust and moisture. The SEC15 cable can resist many common chemicals as well as high-pressure washing. A summary of SecuriHeat d-LIST key performance parameters is shown in Table 3 below.

[3] TCO: Total Cost of Ownership (of an Early Warning Fire Detection system)
[4] ISO 7240-20 [4] and AS 7240-20 [4] are derived from BS/EN 54-20.

Model	Key performance parameters
SecuriHeat SCU 835 (d-LIST) classes and sensors cable	
Classes	Integrating: A1I, A2I, BI, CI Non-integrating: A1N, A2N, BN, CN
Cable length	SEC15 cable 2 x 350 m (1'148 ft) per controller
Addressable sensors # (Zone)	2 x 100 sensors (in 1-32 zones) Sensors embedded in the cable at intervals of: 1, 2, 3, 4, 5 or 10 m (3.3, 6.6, 9.9, 13.0, 16.5 and 33.0 ft.)
Rating and operational data	
Rating	SCU 835 Sensor Control Unit (evaluation unit): IP65 SEC15 cable: weather-proof fully sealed system
Operating temperature	SCU 835 Sensor Control Unit: -25°C to +70°C (-13°F to +158°F) SEC15 cable: -40°C to +85°C (-40°F to +185°F)
Measuring temperature range	SEC15 cable: -40°C to +120°C (-40°F to +248°F) Temperature resolution of 0.1°C (0.18°F)
Sensing Cable Attributes	Cable Diameter: 15 mm (0.59 in); Min. Bending Radius: 250 mm (9.8 in)
Detection and actuation	Maximum temperature and temperature changes (differential or integration algorithm)
# of Relays	4 Built-in; Expanded to 16 with REL 835 Module
Product type approval standards and compliance level	
EN 54-22:2015+A12020	Integrating and non-integrating line-type heat detector; Response classes: A1N, A2N, BN, CN as well as A1I, A2I, BI, CI
UL 521; NFPA compliant	Response Classes: LOW, ORDINARY, INTERMEDIATE

Table 3 SecuriHeat d-LIST SCU 835 controller and SEC15 cable

The SEC15 cables are fire retardant and halogen free, resistant to water, chemicals, gases and shocks with high EMI immunity.

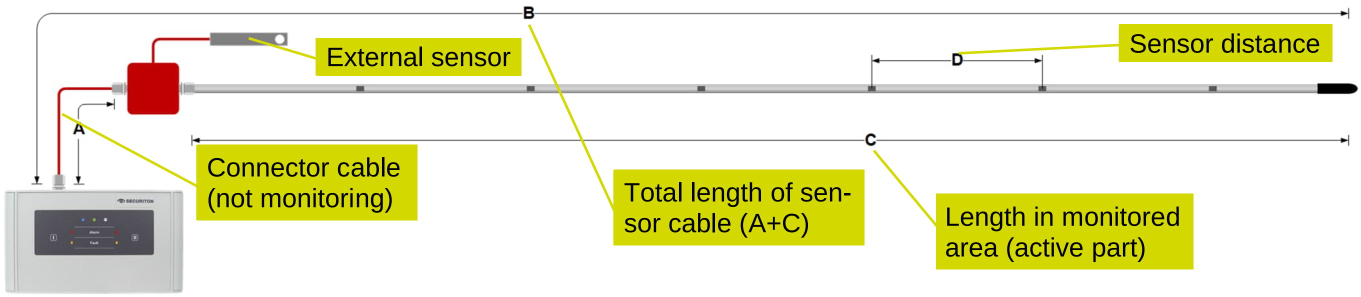
4.3 Application scenarios

SecuriHeat d-LIST is ideal for risk-based protection of escalators and travelators in both indoor and outdoor applications where addressable heat detection and alarm control are implemented. This chapter outlines design recommendations and methods using SecuriHeat d-LIST products to protect specific areas around escalators and travelators.

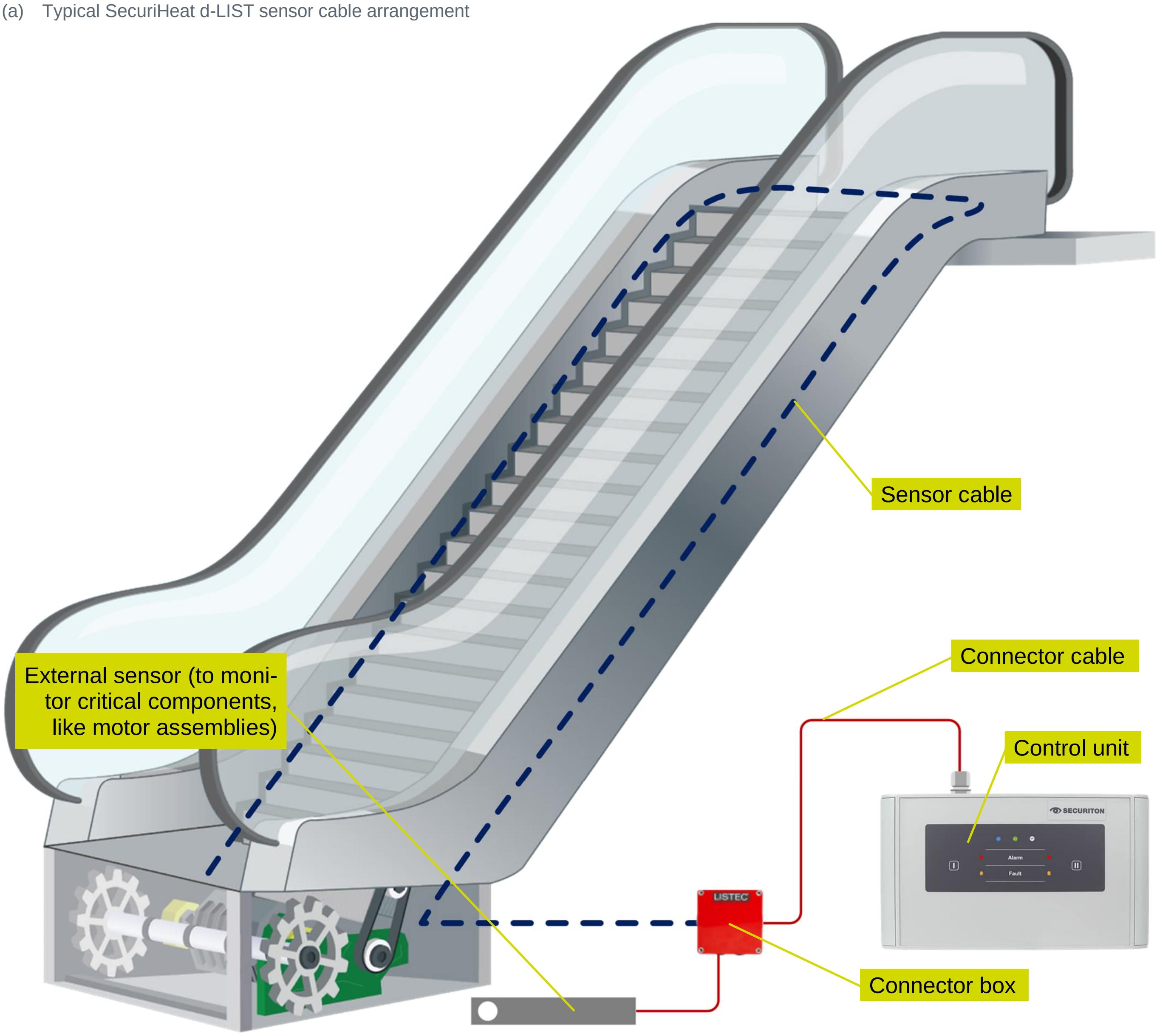
The d-LIST system consists of a control unit (SCU 835) and a length of up to 350 m (1'148 ft) of SEC15 cable. SEC15 comes in a variety of options, with sensors embedded in the cable at various intervals (see Table 3), or to bespoke design. The general system layout is illustrated in Figure 3 (a). In order to achieve early warning of a fire – or a heat build-up around a motor or friction point – a sensor must be in relatively close proximity. Therefore, it is suggested to use spacings of 1 m (3.3 ft), providing the opportunity to catch a potential incident at the earliest and least problematic stage. The SEC15 cable is then installed and fitted to the truss (see Figure 2 and Figure 3 (c)) of the escalator or travelator, ideally positioned on either side and adjacent to, but not touching, any rollers and motors that help position, tension and drive the main staircase or walkway.

With many designs including such with components on either side of the walkway, a double line of cable – one on the right and one on the left side of the truss – is recommended in order to ensure that sensors are in proximity to any and every risk and hazard. Additional external sensors mounted directly on critical components of the escalator or travelator, like the motor assembly, further enhance early detection (illustrated in Figure 3 (b) and Figure 3 (c)).

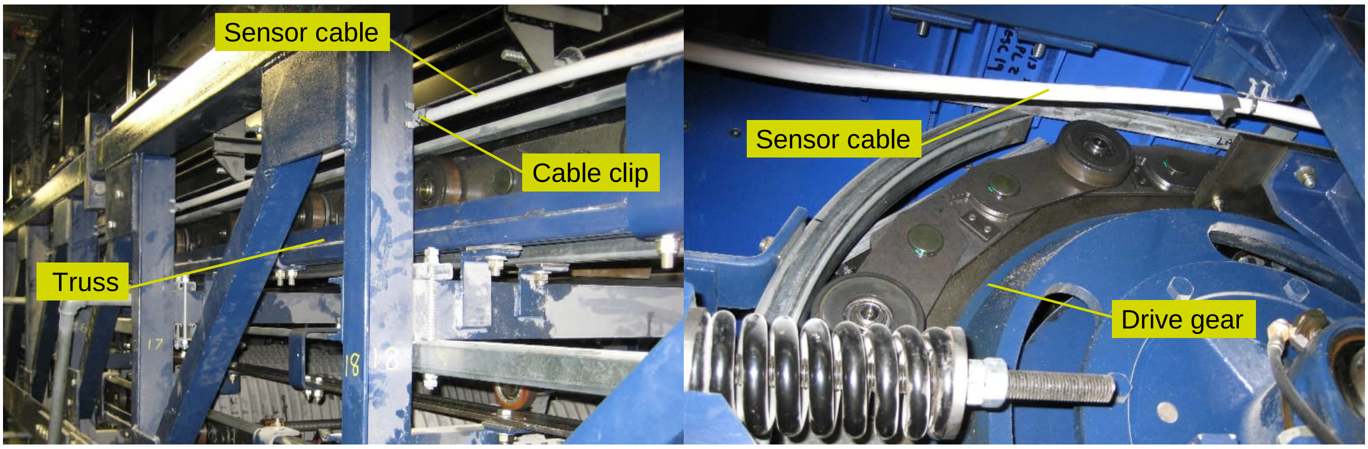
The relevant SEC15 cable, as shown in Figure 3 (b), would then be linked to a control unit positioned in a convenient space by using a connector box and connector cable.



(a) Typical SecuriHeat d-LIST sensor cable arrangement



(b) Fire detection placement SecuriHeat d-LIST sensor cable and external sensors



(c) SecuriHeat d-LIST placement in an escalator

Figure 3: Typical positioning of SEC15 sensing cable to protect an escalator or travelator as part of d-LIST LTHD system

The following points may be useful when considering the installation:

- Sensor cables run generally in parallel to the main escalator or travelator belt. They are robust yet flexible enough to be bended to go around obstacles, machinery structure and fittings when needed.
- Cables are positioned securely underneath the moving steps or platforms where the space is having the highest risk of fire. The placement of sensor cables is to avoid unintentional damage; and avoid exposure to direct sunlight when installed outdoor or semi-enclosed areas with exposure to weather elements.
- The CBO 15 connection box allows branching as part of d-LIST layout design. This is not generally required for protecting escalators and travelators, as they are linear by nature. However, it may be useful to help position the controller away from public areas using a further length of connector cable (without sensors), or to connect external sensors which monitor critical components. Such branching will also be useful in allowing one control unit to cover multiple escalators.
- SecuriHeat d-LIST offers a choice of max alarm or difference alarm to enable pre-signals for early alert. In tests *«It showed the highest rate-of-rise, and overall temperatures of the whole escalator under test, but had still failed to record a "pre-alarm". This was proof that the differential temperature rise calculations appear to negate the chance of false alarms caused by extreme machine chamber temperatures, (which occur gradually), whereas a fire would produce a rapid rate-of-rise and therefore an alarm condition.»* [19]. It is therefore best suited to escalators and travelators unless these are in unusually harsh environments – such as perhaps some outdoor areas where ambient temperatures among machinery exposed to the sun may be very high.

4.4 Integrated verify, control and respond

SecuriHeat d-LIST features two levels of alarms: the alert ('Pre-signal') and alarm signal ('Alarm'). Typically, alert from one sensor escalating to alert from adjacent sensor or alarms from the originally alerted sensor provide timely alert to an overheating or early stage of a fire situation, while alarm signal is used for fire alarm as well as pre-action sprinkler actuation. Table 4 summarises the use of multilevel alarms from SecuriHeat d-LIST.

Level	Signal	Typical use
1	Pre-signal	Verify and control (manually initiate the suppression)
2	2nd sensor pre-signal	Automatic stop of operations and machinery; call emergency team
3	Alarm	Initiate fire alarm; call fire brigade; initiate suppression

Table 4 Alert and alarm levels for SecuriHeat d-LIST

4.5 General building protection

Escalators and travelators are commonly used in large public structures such as shopping malls, railway and rapid transit hubs, airports and exhibition centres. These built environments consist of various building occupancy and use classifications per international and national codes and standards and mandated by the local Authority Having Jurisdiction (AHJs).

The application scenarios and ensuing design recommendations in this guide are for PBD, risk-informed additional protection of an object which is both fire hazard and a key part of evacuation infrastructure. It is assumed that the wider area is separately protected by fire detection systems designed to meet statutory requirements as a minimum. For general building protection and Securiton detection system design for relevant applications, Table 5 shows relevant Design Guides and Case Studies available at www.securiton.com/en/industries-applications

Related Built Environment	Securiton Design Guide/Case Study
Public Assembly	Design Guide: Large Retail Outlets & Malls Design Guide: Large Open Spaces
Transport infrastructure	Design Guide: Airports Design Guide: Rail and Rapid Transit Hubs
Healthcare	Design Guide: Hospitals & Large Clinics

Table 5 List of Securiton application design literature

4.6 System integration considerations

SecuriHeat d-LIST detection systems can be connected to a building FAS or, to actuate the release of the fire extinguish systems, to an Escalator Sprinkler Protection System (ESPS) panel using the onboard relays. Depending on the number of machines deployed on a site, a laptop for easy monitoring and troubleshooting can be connected

In general, monitoring and managing SecuriHeat d-LIST detection systems can be realised with the d-LISTconfig software or through an enterprise BMS software when integrated.

4.7 Features and benefits

Securiton AG as a whole is certified in accordance with ISO standards 9001, 14001 and 45001 and thus meets globally applicable standards with regard to quality management, environmental management, and occupational health and safety management systems.

Securiton SecuriHeat products provide comprehensive line-up for both addressable and non-addressable applications. d-LIST offers unobtrusive, easy to install heat detection that is immune to harsh environments and can easily be cleaned and maintained. It is compatible with the principles of Intrinsically Safe Design and can be used in combination with SecuriSmoke ASD in the most demanding Performance-based Designs.

Summary of benefits of SecuriHeat d-LIST products:

Feature	Benefits
Individually assessable sensors	Rapid pinpointing of incipient fires
Sealed cable with choice of sensor spacings	Easy installation, no maintenance required
Extremely durable cables	Operate in extreme environments, easy to clean

4.8 Non-intrusive system access for ITM

The SecuriHeat d-LIST sensor cable and the external sensors are maintenance free, because they are completely shielded against external influences. In addition, the individual sensors are tested for their function in each measuring cycle. Individual sections of the cable can be replaced easily in case of mechanical damage.

4.9 Support with peace of mind

The SecuriHeat d-LIST system is supported by d-LISTconfig software.

Application support includes mainly:
- Partner accreditation program
- Application and field engineering support
- Worldwide reach through a network of partners as well as subsidiaries and investment companies, with branch offices or local employees on all continents.

List of references

[1] ASME, (2019) A17.1/CSA B44 Safety Code for Elevators and Escalators, New York, USA
[2] ASME, (2007(R2012)) A17.7/CSA B44.7 Performance-Based Safety Code for Elevators and Escalators, New York, USA
[3] BS/EN 115-1:2017 Safety of escalators and moving walks - Construction and installation, Published: 30 Sep 2017
[4] Standards Australia, AS1735.5 (2003) Lifts, escalators and moving walks, Part 5: Escalators and moving walks, Sydney, Australia
[5] The British Standards Institute (BSI), BS/EN 54-22:2015+A1:2020, Fire detection and fire alarm systems - Part 22: Resettable line-type heat detectors, London, UK
[6] NFPA, (2018) NFPA 101® Life Safety Code®, Quincy, MA, USA
[7] NFPA, (2018) NFPA 5000® Building Construction and Safety Code®, Quincy, MA, USA
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