TEMPERATURE MONITORING SUBWAY TUNNELS AND METRO STATIONS

Isen, September 2025

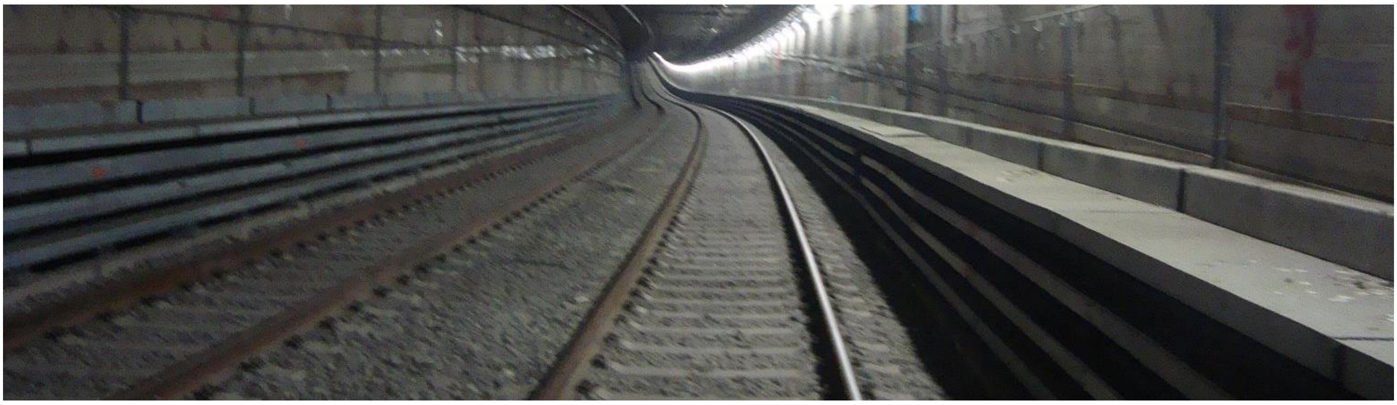
Early warning with the LIST and d-LIST System

This white paper describes the challenges of fire protection in underground railway tunnels and metro stations and shows how the LIST and d-LIST linear heat detection systems from LISTEC GmbH localise fires and initiate further measures to protect people, buildings and goods.

Table of Contents

1. Introduction & Press Reports 3
2. Triggers, Risks & Challenges 4
3. LISTEC solutions 5-6
4. Application/Installation/Monitoring 7
5. Certificate excerpt 8

1. Introduction & Press Reports



Metro and underground railway systems form the backbone of urban mobility. Millions of passengers use these infrastructures every day to reach their destinations quickly and efficiently. At the same time, the underground structures, technical equipment and high passenger numbers pose a particular risk, especially with regard to fires. The safety of passengers and employees is a top priority. Modern fire protection technologies, such as linear heat detectors from LISTEC GmbH make a decisive contribution in this regard.

Fires in subway tunnels and metro stations.
Examples from press reports:

June 24, 2025, Düsseldorf
A blocked subway brake leads to a major fire department response.

https://www.duesseldorf.de/feuerwehr/aktuelles/detailansicht/newsdetail/blockierte-bremse-einer-u-bahn-fuehrt-zu-einem-groesseren-feuerwehreinsatz

August 20, 2025, Hamburg
Cable fire paralyses train service
Subway station in Hamburg evacuated

https://www.mopo.de/hamburg/chaos-im-feierabendverkehr-u-bahnhof-in-hamburg-evakuiert/

2. Triggers, Risks & Challenges

Fires in metro and underground stations are often caused by a combination of technical complexity, human behaviour and the specific conditions of underground structures. These factors not only increase the likelihood of fires, but also the risks to passengers, staff and infrastructure.

Typical triggers

- Defects: short circuits, cable fires, defective components.
- Mechanical defects on the train: brake overheating, faults in electrical components.
- Human error: smoking despite the ban
- Overheating: drive motors of escalators or ventilation systems.
- Foreign objects: rubbish, highly flammable materials or liquids.
- Sabotage or arson.

Special risks

1. Danger to human life
- Smoke development: Smoke can spread quickly underground and block escape routes.
- Heat exposure: Extreme temperatures pose an immediate risk to passengers and staff.
- Panic reactions: High passenger density can lead to mass panic and injuries in the event of a fire.

2. Damage to infrastructure
- Damage to technical equipment: Escalators, cable trays, ventilation systems and signalling technology can be irreparably damaged.
- Structural damage: Concrete and steel structures can be weakened by heat.
- Operational standstill: Prolonged outages of lines or entire networks are possible.

3. Economic risks
- High repair and restoration costs.
- Loss of revenue for operators and associated business areas.
- Increased insurance costs and possible legal consequences.

4. Social and organisational risks
- Impairment of public safety: Restrictions on local transport have a direct impact on the mobility of the population.
- Loss of trust: Frequent or serious incidents can have a lasting impact on passengers' sense of safety.
- Complex evacuation and rescue scenarios: Underground structures make the work of fire and rescue services more difficult.

Challenges in fire protection for metro and underground railway systems

- Confined structures: Tunnel systems and stations are usually limited in space, which makes rapid evacuation difficult.
- High passenger density: Rush hours lead to enormous numbers of passengers on platforms and in trains.
- Complex technical infrastructure: Escalators, cable trays, storage facilities and trains harbour different fire loads.
- Difficult firefighting: Underground structures are difficult for fire brigades and rescue services to access.

3. LISTEC solutions

LISTEC GmbH has been developing, manufacturing and distributing a sensor cable system for early fire detection and temperature measurement for over 30 years. The company is located near Munich, from where our products are distributed worldwide – **'Made in Germany'.** The robust, enclosed design of the cable makes it ideal for the demanding conditions in underground stations and metro tunnels, where dust, dirt, moisture or extreme temperature fluctuations can occur.

A particular focus is on use in metro and underground tunnel systems. Here, the LISTEC sensor cable ensures reliable early fire detection along the entire length of the tunnel. Temperature sensors are integrated at defined intervals, enabling the precise localisation of temperature increases. In this way, incipient fires can be detected at an early stage and targeted countermeasures initiated – a decisive factor for the safety of passengers and staff.

The **LIST (SEC 20)** and **d-LIST (SEC 15)** systems are among the leading electronic sensor cable technologies and have been used successfully for decades in metro and underground tunnels as well as other safety-related applications.

Advantages of the LIST and d-LIST systems

- Constant and permanent temperature monitoring with temperature rise warning
- Precise fire detection and localisation thanks to individually addressed sensors
- Permanent temperature measurement from -40ºC to +85ºC
- Exact localisation thanks to individually addressed sensors
  (important in combination with fire extinguishing systems)
- Detection of danger zones
- In the event of a fire in the tunnel: detection also in other parts of the tunnel (detection of simultaneous fires at different locations)
- Differential and maximum temperature evaluation
- Resistant to dust/dirt/gases/vibrations
- Installation possible in single-branch operation or with multiple branches
- Measurement resolution (always 0.1 °C, internally 0.0625 °C for d-LIST)
- Repeat accuracy (always ± 0.1 K along the entire cable length)
- Sensor distances freely selectable, individual identification possible at any time via cable markings
- Systems are generally maintenance-free, resulting in long-term cost savings
- Low commissioning and maintenance costs
- Calibration-free and location-specific resolution in the event of a fire over the entire service life
- Use of individual sensors for object monitoring can be integrated into
  sensor cable installations

Two systems...unlimited possibilities

LIST controller SEC 20 sensor cable

Installed in over 700 tunnel systems

Additional monitoring with individual sensors and for branched routes

Long distances in adverse environmental conditions

Versatile networking

Open protocols

Flexible branching

d-LIST controller SEC 15 sensor cable

Installed in numerous applications

Additional monitoring with individual sensors and for branched lines

Quick and easy installation

Pre-assembly

Our sensor cables trigger further processes in underground tunnels and metro stations: ventilation systems, displays and alarms.

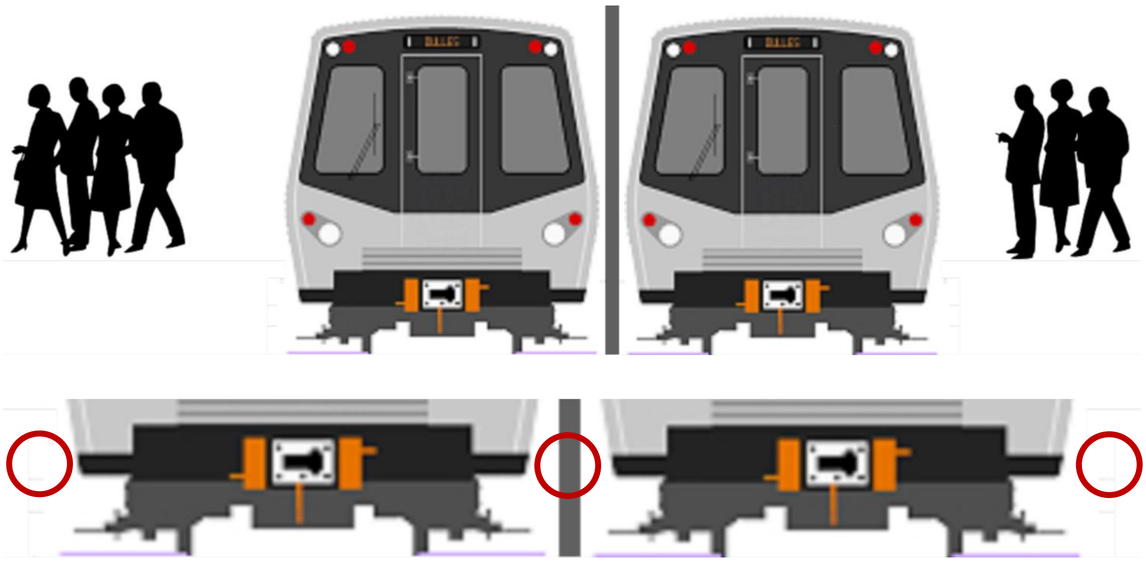
MADE IN GERMANY

4. Application/Installation/Monitoring

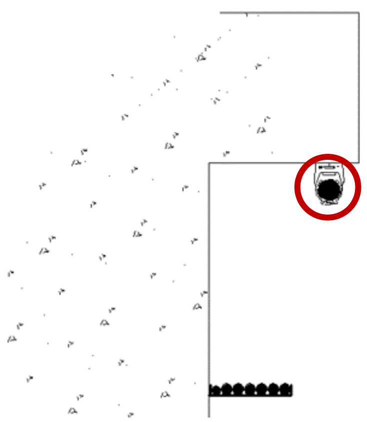
Safety in metro and underground railway systems depends largely on modern fire protection technology. Linear sensor technology from **LISTEC GmbH** enables early detection and localisation of fires, protecting human lives and preventing serious damage to infrastructure. It is therefore an indispensable element for the reliable and safe operation of modern underground railway systems.

- Railway tunnels – route monitoring with LIST sensor cables
- Train storage facilities with d-LIST sensor cables
- Monitoring of underground stations with d-LIST sensor cables
- Monitoring of escalators with d-LIST sensor cables

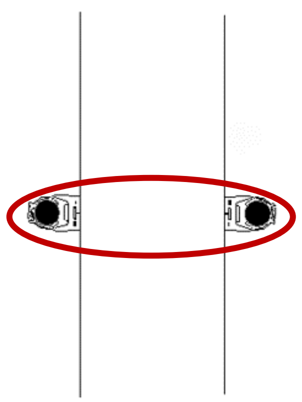
Example: Cable trays below the platform edge/partition wall



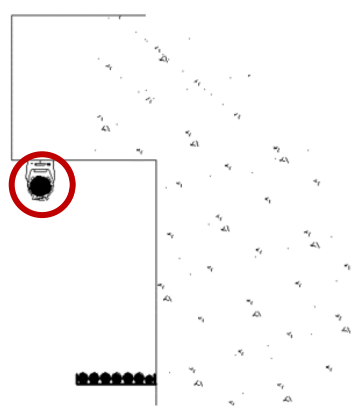
Detail of platform



Detail of partition wall



Detail of platform



5. Certificate excerpt

The **LIST / SEC 20 system and d-LIST / SEC 15 system** are recognised by IBS Linz (Austria) and VdS (Germany), among others, in accordance with EN 54-22:2015+A1:2020:

Anerkennung
Approval

von Bauteilen und Systemen
of Components and Systems

Inhaber der Anerkennung / Holder of the Approval

LISTEC GmbH
Am Sandberg 34
DE-84424 Isen

Anerkennungs-Nr. / Approval No.	Anzahl der Seiten / No. of pages	gültig vom (TT.MM.JJJJ) / valid from (dd.mm.yyyy)	gültig bis (TT.MM.JJJJ) / valid until (dd.mm.yyyy)
G 221004	14	26.06.2023	25.06.2027

Gegenstand der Anerkennung / Subject of the Approval

Rücksetzbarer linienförmiger Wärmemelder /
Resettable line-type heat detector
d-LIST

Verwendung / Use

in automatischen Brandmeldeanlagen /
in automatic fire detection and fire alarm systems

Anerkennungsgrundlagen / Basis of the Approval

VdS 2344:2014-07
VdS 2543:2021-03
EN 54-17:2005 + AC:2007
EN 54-22:2015 + A1:2020

Anerkennung
Approval

von Bauteilen und Systemen
of Components and Systems

Inhaber der Anerkennung / Holder of the Approval

LISTEC GmbH
Am Sandberg 34
DE-84424 Isen

Anerkennungs-Nr. / Approval No.	Anzahl der Seiten / No. of pages	gültig vom (TT.MM.JJJJ) / valid from (dd.mm.yyyy)	gültig bis (TT.MM.JJJJ) / valid until (dd.mm.yyyy)
G 213072	14	31.10.2024	30.10.2028

Gegenstand der Anerkennung / Subject of the Approval

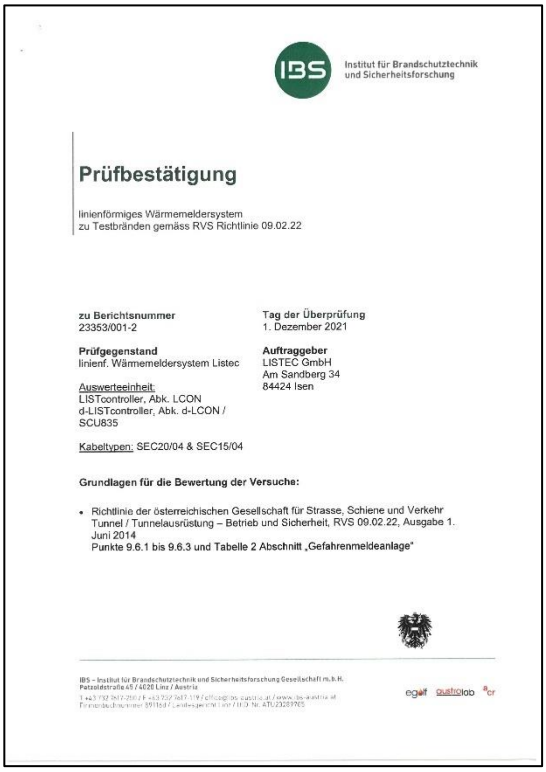
Rücksetzbarer linienförmiger Wärmemelder /
Resettable line-type heat detector
LIST

Verwendung / Use

in automatischen Brandmeldeanlagen /
in automatic fire detection and fire alarm systems

Anerkennungsgrundlagen / Basis of the Approval

VdS 2344:2014-07
VdS 2543:2021-03
EN 54-22:2015 + A1:2020



Institut für Brandschutztechnik und Sicherheitsforschung

Prüfbestätigung

linienförmiges Wärmemeldersystem
zu Testbränden gemäss RVS Richtlinie 09.02.22

zu Berichtsnummer
23353/001-2

Tag der Überprüfung
1. Dezember 2021

Prüfgegenstand
linienf. Wärmemeldersystem Listec

Auftraggeber
LISTEC GmbH
Am Sandberg 34
84424 Isen

Auswerteeinheit:
LISTcontroller, Abk. LCON
d-LISTcontroller, Abk. d-LCON /
SCU835

Kabeltypen: SEC20/04 & SEC15/04

Grundlagen für die Bewertung der Versuche:

- Richtlinie der österreichischen Gesellschaft für Strasse, Schiene und Verkehr Tunnel / Tunnelausrüstung – Betrieb und Sicherheit, RVS 09.02.22, Ausgabe 1. Juni 2014
  Punkte 9.6.1 bis 9.6.3 und Tabelle 2 Abschnitt „Gefahrenmeldeanlage"

IBS – Institut für Brandschutztechnik und Sicherheitsforschung Gesellschaft m.b.H.
Petzoldstraße 45 / 4020 Linz / Austria

For more information, scan the following QR code:

LISTEC GmbH
Am Sandberg 34
D-84424 Isen
Phone: +49 (0) 80 83 53 85-0
Email: sales@listec-gmbh.de