



## Seconds Matter: LHD Protects Traffic Tunnel Germany

### Project overview

The Arlinger Tunnel, part of the B 463 in Pforzheim, Germany, is a vital transportation link spanning 1348 m. Ensuring fire safety in such infrastructure is critical due to the high risk of harm to travelers and the potential for severe structural damage. Fires in tunnels can escalate quickly, leading to dangerous smoke accumulation, reduced visibility, and limited escape routes. Immediate detection and response are essential for protecting lives and maintaining operational safety.

To address these challenges, the tunnel operator had two AP Sensing N45 Linear Heat Detection (LHD) systems installed. The Ø 4 mm sensor cable with its two independent fibers is routed along the tunnel ceiling. The LHD systems, each equipped with a single-channel monitoring, are measuring in opposite directions into one fiber each. This dual-device setup ensures full redundancy and uninterrupted fire detection even in the case of a fiber break. The immediate alarming of fiber breaks enables operators to perform actions promptly without compromising the fire detection capabilities.

### Solution

AP Sensing's N45 LHD technology offers continuous, real-time fire detection along the entire length of the tunnel. The system's fiber optic cable detects temperature increases with high precision, ensuring

rapid and accurate responses to fire events. The setup also complies with stringent safety standards, delivering dependable performance even in the challenging environment of the Arlinger Tunnel.

To validate the system, a fire test was conducted in May 2024.

### Background

- The Arlinger Tunnel is a crucial transport link on the B 463 in Pforzheim, Germany
- Fire incidents in tunnels pose serious risks due to rapid smoke accumulation, reduced visibility, and limited escape routes
- A reliable fire detection system is essential to ensure safety and maintain uninterrupted tunnel operations

### Solution & Benefits

- N45 LHD provides real-time fire detection and precise localization
- Dual-device setup ensures full redundancy and operational reliability even in case of a fiber break
- The system exceeds safety standards, offering fast response time and fire spread tracking



Figure 1: LHD devices

The test featured a simulated car fire using a liquid gas-fueled burner that reached a heat release rate of approximately 5 MW. The objective was to demonstrate the system's ability to detect a fire within 60 seconds and localize it to within 50 meters, as specified by EABT 80/100 standards.

## Results

AP Sensing's N45 LHD system exceeded expectations. During the test, the fire was detected within just 25 seconds—far below the required 60 seconds. The system accurately localized the fire, ensuring operators could act swiftly. This remarkable performance highlights the reliability and precision of the technology, even under high-risk conditions. Key features of the AP Sensing solution include:

**24/7 fire detection coverage:** Continuous monitoring provides real-time alerts and precise localization of fires.

**Redundancy and reliability:** Dual-device setup ensures operational integrity even in case of a fiber break.

**Fire spread tracking:** The system not only detects and localizes fires but also identifies the direction and progression of fire spread, enabling faster and more informed response measures.

**Compliance with industry standards:** Fully tested and verified according to EABT 80/100 criteria.



Figure 2: Fiber optic cables, highlighted in red for visibility

## Conclusion

The successful fire test in the Arlinger Tunnel demonstrates AP Sensing's capability to provide advanced fire detection solutions for critical infrastructure. The N45 LHD system delivers rapid detection, high accuracy, and robust performance, ensuring the safety of tunnel users and protecting valuable assets. With its innovative approach to fire safety, AP Sensing continues to set new benchmarks in tunnel monitoring technology.