

Early Fire Detection in the Recycling Industry

Lithium-Ion Batteries – A Potential Hazard:
How Infrared Thermography Prevents Major Fires

Project: Behrendt Recycling, Neumünster (GER). Partner: Minimax GmbH, FireDos GmbH. Guideline: VdS 3189 (certified & compliant with standards)

An Underestimated Threat

The recycling industry faces a growing challenge: fires at sorting and storage facilities are on the rise with serious consequences for operations, personnel, and the environment. Essentially, two main causes are responsible for the majority of these incidents.

Lithium-ion Batteries – a Daily Risk

Every day, large quantities of used batteries from smartphones, e-bikes, power tools, and household appliances end up in the recycling stream. During the recycling process, these batteries are subjected to mechanical stress—through crushing, pressing, or shredding. This can cause short circuits that trigger an uncontrolled thermal runaway. The cell overheats within seconds, releases highly flammable gases, and ignites, often before staff can react. Fires caused by lithium-ion batteries have become a daily occurrence in the recycling industry and one of the greatest immediate fire hazards the industry has ever faced.

Hot spots – the invisible danger

A second, less obvious but equally serious cause of fire is what are known as hot spots within the pile of material. When waste and recyclables are stored, hot spots can develop inside large piles due to biological processes, self-heating, or trapped heat sources, invisible from the outside but highly dangerous. If oxygen enters these areas, for example, during restacking, opening, or due to drafts, the hot spots can suddenly develop into a full-scale fire.

Early Detection as the Key to Prevention

What these two hazards have in common is that they manifest themselves thermally on the surface, long before an open flame develops. Infrared cameras enable continuous, non-contact temperature monitoring of entire storage areas and conveyor lines, thereby revealing dangerous heat buildup before it leads to a disaster.

The System Solution: 24/7 Continuous Thermographic Monitoring with PYROVIEW 380L FDS

This is where DIAS Infrared's monitoring solutions come into play: they use thermal signatures to trigger automated alerts. At the heart of the system is a high-precision infrared camera strategically positioned to simultaneously monitor the sorting facility, including the conveyor line and adjacent storage areas.

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| [1. Detection] | Infrared camera detects when a threshold is exceeded |
| [2. Alarm] | System triggers an alarm; visual/audible warning to staff |
| [3. Evacuation] | The designated evacuation time is running out (to prevent injury) |
| [4. Firefighting] | The fire monitor automatically points toward the hotspot |
| [5. Containment] | Targeted firefighting operation; to effectively contain the spread of the fire |

The infrared camera detects thermal radiation across its entire field of view. Interfering factors such as dust, vapors, or varying lighting conditions have a significantly smaller impact on measurement accuracy than they do with optical systems. Temperature evaluation and alarms are area-specific. Monitoring zones and alarm thresholds were configured specifically for the facility to reflect the individual thermal characteristics of the respective operating environment.

Emergency Scenario: Automated Cascade from Detection to Containment

In the event of an emergency, a precisely timed, fully automated safety sequence is activated. As soon as the infrared sensors detect that a threshold has been exceeded, the system immediately triggers an alert, providing both visual and audible warnings to on-site personnel. Simultaneously, a defined evacuation period begins to ensure the prevention of personal injury within the danger zone. Once this period elapses, the suppression process starts: the fire control panel activates the fire monitor, which, without the need for manual aiming, automatically targets the exact coordinates of the fire source provided by the DIAS camera. This targeted, automated application of water or foam confines the fire to the immediate area and effectively contains its spread before damage can occur to adjacent material storage bins.

Technical Integration and VdS Compliance

The effectiveness of a fire protection system in an industrial setting depends largely on its integration into the existing infrastructure. DIAS Infrared has integrated the infrared sensor technology into Minimax GmbH's overarching control architecture. Direct communication between the detection and suppression systems significantly reduces interface complexity and response times in the alarm process.

In addition, the entire project meets the strict requirements of the **VdS 3189 standard**:

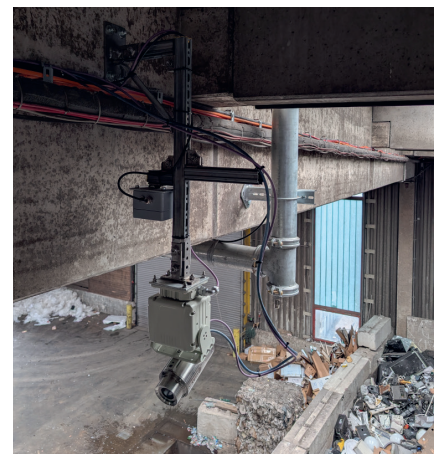
- **Continuity of operation:** The entire system cabling is designed to continue functioning reliably even when exposed to heat and fire.
- **Emergency power supply:** An integrated uninterruptible power supply (UPS) ensures that the fire detection system remains fully operational for at least 30 hours in the event of a power outage.
- **Certification:** Only industrially certified components were used, which guarantees maximum reliability.

Conclusion

The installation at Behrendt Recycling demonstrates that intelligent infrared thermography, combined with modern fire suppression technology, is revolutionizing fire safety in the recycling industry. Rather than managing damage after the fact, the system proactively prevents major fires from breaking out. The earlier a fire is detected, the greater the chance of maintaining operations, protecting employees, and preserving property.

System Components at a Glance:

- Heat Detection & Early Warning: PYROVIEW 380L FDS Infrared Camera System | DIAS Infrared GmbH
- Automatic Fire Suppression: Fire Suppression Monitor | FireDos GmbH
- Central Control & Integration: FMZ 6000 Fire Alarm Control Panel | Minimax GmbH



Do you have questions about our PYROVIEW FDS early fire detection system or any other concerns?

We'd be happy to advise you, free of charge:

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