



GUIDE BATTERY STORAGE · 7 MIN.

Maintaining and Inspecting Thermal Barriers in Operation: Intervals, Checkpoints, Documentation

Thermal barriers only protect battery energy storage systems if they remain intact over the years. This guide shows which inspection intervals have proven effective, what to look for during inspection, and how documentation stands up to authorities and insurers.

Operator Responsibility: Why Barriers Must Not Be Left to Themselves After Acceptance

With commissioning, responsibility for the safe operation of a battery storage system passes to the operator. The operator must prepare and keep updating a risk assessment that expressly considers the operating state "maintenance/servicing" — as required, among others, by the BVES safety guideline for large-scale lithium-ion storage systems. The legal anchors are the German Occupational Safety and Health Act, DGUV Regulation 1, the Industrial Safety Ordinance with its duty to keep work equipment and safety-relevant installations in proper condition, and the conditions of the building permit and the fire protection concept.

Thermal barriers — fire-resistant partition walls, fire walls between storage units, seals on cable and pipe penetrations, fire-rated doors and insulation layers — are particularly sensitive in this respect: they act passively, give no indication of malfunction in everyday operation, and only fail when a fire occurs. Without systematic inspection, a damaged sealing profile or an unsealed cable penetration goes undetected for years.

Note: Passive Systems Do Not Report In — Unlike fire detection or suppression systems, structural barriers have no self-monitoring. Their reliability comes exclusively from recurring visual inspection, professional repair and rigorous checks after every intervention in walls, ceilings or penetrations.

Intervals: Which Inspection Rhythms Have Proven Effective

Established intervals exist for many components of structural and building services fire protection, and operators of battery storage systems should follow them too. Where no explicit requirement exists, the intervals should be derived from the risk assessment, the manufacturer's specifications and the conditions of the building permit — and agreed with the property insurer.

- Continuously or at every walk-through: visual check for mechanical damage, open doors, obstructed explosion relief openings and combustible materials stored within the clearance zone.
- Monthly: functional check of hold-open devices on fire and smoke closures by the operator (based on DIN 14677).
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Every six months: functional testing of fire dampers in ventilation systems; the interval may generally be extended to one year after two consecutive defect-free maintenance checks.

- Annually: expert inspection of the thermal barriers as a whole — partition walls, joints, penetration seals, doors including gaskets and self-closing function — plus maintenance of the hold-open devices by a qualified specialist; at the same time, annual review and updating of the risk assessment.
- Recurring under state law: for plants classified as special structures, the state inspection ordinances prescribe regular inspections of safety installations by approved inspection experts; deadlines and scope vary by federal state.
- Event-driven: after every thermal event, after conversions, retro-installed cables and lines, transport damage or exceptional weather impacts.

For storage containers sited outdoors, a seasonal check is also advisable: after winter, gaskets, weather protection and drainage should be inspected, since frost, de-icing salt and standing water age joints and insulation layers faster than indoor operation does. The defined intervals belong in the maintenance schedule, which many property insurers require as evidence anyway — those who document them bindingly there fulfil their obligations to authorities and insurers in one step.

Checkpoints: What Matters When Inspecting Thermal Barriers

A robust inspection follows a fixed checklist that traceably assesses the protective function of every barrier. At its centre stands the question: would this element still deliver its fire resistance for the planned duration if a fire occurred?

- Partition walls and fire protection boards: cracks, spalling, moisture damage, corrosion of subframes, unauthorised drill holes or fixings.
- Joints and connections: condition of permanently elastic and intumescent joint systems, complete filling, adhesion to the flanks.
- Cable and pipe penetration seals: conformity with the fitness-for-use evidence (national or European evidence such as aBG, abP or ETA), identification plates present, no subsequently routed services without proper resealing.
- Fire-rated doors and flaps: gaskets, hinges, closing sequence and self-closing function; no wedges or other impermissible hold-open aids.
- Explosion relief openings: clear, functional, not obstructed by attachments, stored goods or vegetation.
- Insulation and weather protection on containers: intact cladding, no soaked or sagging insulation, tight penetrations for cable trays and HVAC equipment.
- Signage: warning notices for lithium-ion batteries to VDE-AR-E 2510-2 present and legible at the entrances.

Note: Most Common Weak Point: The Retro-Installation — Experience shows that most defects in thermal barriers arise not from ageing but from subsequent trades: a new data line is pulled through the penetration seal and the opening only provisionally closed. Every penetration should therefore be subject to an approval process and be professionally resealed and documented immediately after completion of the work.

Documentation: Audit-Proof for Authority and Insurer

The best inspection loses its value if it cannot be evidenced. Authorities check compliance with permit conditions during recurring site visits; property insurers require maintenance schedules and demonstrable implementation as a policyholder obligation. A three-part structure has proven effective: an inventory of all fire-protection-relevant components, an inspection and maintenance schedule with deadlines and responsibilities, and a continuous inspection log with findings, photos and defect tracking.

- Penetration register: record every penetration with location, system, fitness-for-use evidence and installation date.
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Findings documentation: record defects with a photo, an urgency rating and a deadline for rectification; document the effectiveness check after repair.

- Repairs only with approved systems and by demonstrably qualified installers; clarify material changes from the approved condition in advance.
- Retention: keep inspection reports for the entire operating life and notify the insurer of changes to the protection concept.

Those who establish inspection and documentation as a fixed part of the operational management concept fulfil more than formal duties. They ensure that the protective effect of the thermal barriers assumed in the fire protection concept genuinely exists over the plant's entire service life — and that is precisely what counts when it matters.

Frequently asked questions

Is there a statutory inspection interval specifically for thermal barriers on battery storage systems?

No uniform federal provision exists. What governs are the conditions of the building permit, the state inspection ordinances for special structures, the Industrial Safety Ordinance and the manufacturer's specifications. In practice, an annual expert inspection of all structural fire protection installations has become established as the minimum standard, supplemented by event-driven checks after every intervention.

Who may repair penetration seals and fire protection components?

Repairs must be carried out with the approved system in question and in accordance with the fitness-for-use evidence (general construction type approval, general building authority test certificate or European Technical Assessment). They should only be executed by demonstrably qualified specialists or specialist contractors, since deviating materials or installation methods can nullify the fire resistance duration.

What must be done after a thermal event or near miss?

Affected barriers must be fully assessed before recommissioning — including apparently undamaged areas, since heat and smoke gases can degrade the protective effect of insulation materials and seals. Findings, repair and release should be documented and the risk assessment subsequently updated; the insurer must be informed of the event.

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